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ENGINEER

The Professional Bulletin of Army Engineers

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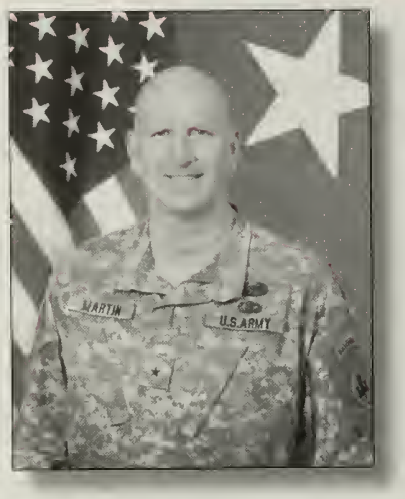
Clear The Way

By Brigadier General Gregg F. Martin
Commandant, United States Army Engineer School



On behalf of the United States Army Engineer School, I would like to welcome the entire engineer community, to include spouses, to the annual Engineer Regimental Conference—ENFORCE 2008. This year's conference activities will be held in two locations: St. Louis, from 4–6 May, and Fort Leonard Wood, from 7–10 May.

Beginning with the Army Engineer Association (AEA) icebreaker on Sunday evening, you can expect the following days to be filled with extraordinary events and social activities. We have scheduled several engaging speakers, to include the Chief of Engineers with his State of the Regiment address. In addition, there will be United States Army Corps of Engineers (USACE) break-out sessions, Engineer School work groups, contractor-industry events, vendor displays, along with several ceremonial activities, including the AEA President's Dinner, the Regimental Ball, the Regimental Review, the Commandant's luncheon, and the "Remembering Our Heroes" Memorial Service. You are invited to end the conference week on Saturday with a few rounds of golf at the Fort Leonard Wood Piney Valley Golf Course. Activities are also planned for spouses in both St. Louis and Fort Leonard Wood throughout the week.

One of the highlights of the Regimental Ball will be the Chief of Engineers presentation of the Itschner, Outstanding Engineer Platoon Leader (Grizzly), Van Autreve, and Best Sapper Competition Awards, as well as the Sturgis and de Fleury Medals. Congratulations to all the recipients! Once again, you have demonstrated the outstanding accomplishments of the Regiment.

The ENFORCE 2008 theme is "Building Great Engineers," which stems from our ongoing Engineer Leader Technical Competency (ELTC) Study. The analytical framework for the ELTC Study is from the book *Good to Great* by Jim Collins. The Study is part of a larger strategic issue of how best to manage our precious human talent in the Information Age, during an era of persistent global conflict. We MUST figure out how to properly access, develop/train/educate, employ, and retain our great engineers for full-spectrum operations, which requires a blending of both great tactical and technical expertise and capabilities in our Regiment.

We are teaming with people and organizations from across the Army, joint forces, allies, academia, industry, and professional organizations to plan how we can get the right people on the right seat on the right bus. To this end, much of our ENFORCE time at Fort Leonard Wood will be spent in six work groups that are assigned the task of paving the way ahead for the Regiment. The work groups are—

- Future Engineer Missions, Roles, Methods of Delivery
- Accessions
- Training and Education (post-accession)
- Employment
- Retention
- Strategic Communications

The deliverable on Friday, 9 May, will be a back-brief from each work group—with a written action plan—to the Chief of Engineers and the Regiment. These action plans will address "cradle to grave" personnel management and will be the foundation of our Regimental Campaign Plan, which will set our course for the future.

In addition to the hard intellectual work, we will have a great time of fellowship and enjoyment, learning and professional development, as we celebrate the achievements, traditions, and history of our great Regiment.

I am looking forward to ENFORCE 2008! It is a great event for the entire Regiment—Civilians, Soldiers, and Families; Active, Guard, Reserve; USACE; Directorates of Public Works (DPWs); Retirees; Academia, and Contractors. We will also embrace our Joint, Interagency, Intergovernmental, and Allied teammates, from whom we have much to learn and whose good ideas we will shamelessly steal (while willingly sharing our own). Together, we will make this an ENFORCE to remember!

Lead The Way

By Command Sergeant Major Clinton J. Pearson
United States Army Engineer School

To all the engineers who don't run the world but who make it run, I'd like to once again extend my heartfelt appreciation for all you do to help make our Regiment great. Here at the Engineer School, we have won, then lost—and in some cases won back—key battles in regard to our Regiment's organizations, equipment, personnel, and doctrine. Although some of the faces have changed, and will continue to change, the mission here at Fort Leonard Wood will always be to ensure that our Regiment is relevant and integral to the Army's transformation.

I have visited most of our engineer Soldiers throughout the world, and I'm always impressed with their enthusiasm and professionalism when they perform their duties. Our engineer Soldiers are the busiest in our Army and are the busiest they have ever been over the last 20 years.

Soon Fort Leonard Wood will host two important yearly events for our Regiment—ENFORCE and the Best Sapper Competition:

ENFORCE 2008. This year's ENFORCE, with the theme of "Building Great Engineers," will have more than one regimental concept, as we bridge the gaps between our Corps and Regiment. We will leverage all of the experience from our Corps's senior leadership, as well as our civilians. ENFORCE 2008 will begin in St. Louis, from 4 - 6 May, and the conclusion will be at Fort Leonard Wood, from 7-10 May. I look forward to seeing many of you at this year's events, and I hope that you are planning to spend the week renewing friendships and resolving issues as we focus on our full-spectrum engineering capability in support of our Army.

ENFORCE 2008 will be filled with extraordinary events and social activities in both St. Louis and Fort Leonard Wood, to include vendor displays, the Regimental Review, a barbecue, an Army Engineer Association luncheon, the Engineer Run, the Regimental Ball, the Engineer Memorial Dedication Service, and the Best Sapper Competition. The conference will culminate with the annual Regimental Dinner, where we will recognize our 2008 Itschner, Sturgis, and Grizzly Award winners, along with our Honorary Colonel of the Regiment, Honorary Command Sergeant Major, and Honorary Warrant Officer. To sum it up, ENFORCE 2008 will undoubtedly instill in each of us an immense sense of pride in our Regiment.

Best Sapper Competition. The 3d Annual Best Sapper Competition, held at Fort Leonard Wood from 6 - 8 May, will coincide with ENFORCE for the second time. Last year's competition was won by the 66th Engineer Battalion from Hawaii, which took first place for the last two years. *The ultimate measure of a person is not where he stands in the moments of comfort and convenience, but where he stands at times of challenge and controversy.* I challenge all high-speed, qualified sapper Soldiers to dethrone the Tropic Lightning and claim the top honors as the best sapper team.

The competition, which includes events involving demolitions, mountaineering, U.S. and threat weapons, land navigation, and more, tests the knowledge, physical prowess, and mental fortitude of engineer Soldiers across the Regiment. Conducted in two-man buddy teams, the competition is open to all personnel serving in a 21-series MOS, or anyone who has completed the Sapper Leader Course. This is the defining competition for the Engineer Regiment and its Soldiers. So select and train your best teams for this extraordinary competition! I encourage all commanders and sergeants major to plan ahead and come to Fort Leonard Wood to show your support to our Sappers.

In closing, I am extremely proud of our Regiment's Soldiers for their contributions and positive impact over the past year. I am especially proud of the sappers who are deployed around the world in harm's way. To those who have made the ultimate sacrifice in the cause of freedom, justice, and the American way of life, neither you nor your Families will be forgotten. God Bless America!

Join the Campaign:

Engineer Leader Technical Competency

By Colonel Jerry C. Meyer and Brigadier General Gregg F. Martin

> *Great vision without great people is irrelevant.*
>
> — *Good to Great,* Jim Collins

The Chief of Engineers has received several indicators recently that engineer leader technical competency has declined. Some of these indicators are—

- Criticism of the United States Army Corps of Engineers (USACE) in the aftermath of Hurricane Katrina.
- Comments from senior military leaders concerning engineer support to the War on Terrorism.
- Known decreases in military engineering developmental assignments in USACE and in installation directorates of public works (DPWs).
- A decades-long shift away from the more balanced and full-spectrum approach that characterized our Regiment for most of its history, toward a predominantly sapper (mobility and countermobility) mentality in the Engineer Regiment.

All of these factors indicate that this decline may cross multiple levels of both civilian and military leadership.

Make no mistake—combat engineering, tactical warfighting expertise, and our Sapper-Warrior spirit are still paramount, and the hallmark of our Regiment. But today's operational environment of persistent conflict requires a more balanced engineer capability that can more effectively deliver combat, general, and geospatial engineer effects in order to expertly support full-spectrum operations.

Another factor spotlighting the need for—and perhaps magnifying the decline of—competency is Department of Defense Directive 3000.05, *Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations*, which places stability operations as a major priority on par with combat operations. Recently released Army Field Manual 3-0, *Operations*, echoes this theme and further emphasizes the Joint Publication 3-0, *Joint Operations*, definition of *stability operations* to include "infrastructure reconstruction." For the Engineer Regiment, this has placed increased emphasis on construction engineering skills and interagency operations.

Engineer Technical Competency

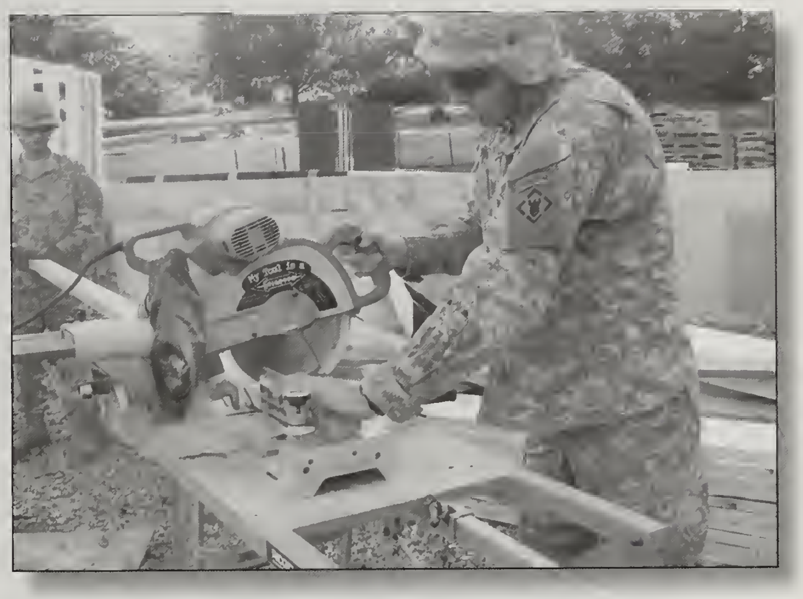
What is engineer technical competency? The phrase "engineer technical" refers to those skills unique to Army officers (commissioned, warrant, and noncommissioned [NCO]), enlisted Soldiers, and civilians that differentiate engineer abilities from those found in most other Army branches, military occupational specialties, and civilian career programs. "Competency" is the occupation-based knowledge, skills, and abilities required for successful and acceptable job performance. Though initially associated with construction and general engineering tasks under current stability operations, engineer technical competency also encompasses a myriad of broader Army engineer capabilities such as geospatial, firefighter, underwater diving, and utilities competencies.

USACE began its investigation into issues, problems, and factors related to technical competencies and mission execution in 2005. Among the findings of a 2006 Logistics Management Institute study were:

- There is no corporate agreement and understanding of the USACE competencies needed to successfully deliver a wide range of engineer products and services.

- There are multiple noninegrated, competency-related initiatives underway within USACE.
- There is no corporate champion for competency development.
- There is no integrated sense of urgency regarding competency.
- The USACE culture does not readily accept the integration and changing nature of delivering its services.

Subsequent actions established a USACE National Technical Competency Strategy and a team to develop integrated, sustainable ways to effectively and efficiently implement that strategy. Concepts from Jim Collins's book *Good to Great* are being used to further study and mitigation.


Lieutenants assist in a Habitat for Humanity project as part of their training and education in the general engineering module during the Engineer Basic Officer Leader Course.

In light of the perceived decline and increased capability requirements, the Chief of Engineers, Lieutenant General Robert Van Antwerp, enlisted the Commandant of the United States Army Engineer School to lead further investigation and resolution of the decline. Using the model and lessons learned by USACE, the Commandant has championed and widened the efforts across the Engineer Regiment.

The Flywheel Effect

It takes great effort to get a flywheel to move from a standstill and inch forward. With continued pushing, the flywheel eventually will begin to move faster until it rotates. As it makes more turns—moving faster and faster—the momentum of the heavy wheel comes into play, and its own weight helps keep it going. Now there is no need to push harder and the flywheel accelerates, building momentum and increasing speed.[1]

The Commandant of the Engineer School has partnered within and outside the Department of Defense to investigate and implement solutions to reverse the decline of engineer leader technical competency. Army participants include—but are not limited to—the Engineer School, USACE, United States Military Academy at West Point, various organizations within Accessions Command, Human Resources Command, Office of the Chief of Engineers–Pentagon, Office of

Students from the Engineer Basic Officer Leader Course take bridge measurements as part of their route reconnaissance training.

Photo by SPC Robert Woodward

Soldiers of the 299th Engineer Company span the gap in the bridge over the Kazer River, created during the war by Iraqi forces.

Economic and Manpower Analysis (OEMA), Reserve Component, Training and Doctrine Command's Capabilities Development and Integrations Directorate, and the Maneuver Support Center's Directorate of Training. Participants outside the Army include engineering-related organizations from sister Services and joint engineers, allied countries, academia, private organizations, and industry.

Sustainable Strategy

The intent is to develop and implement an integrated, sustainable National Engineer Leader Technical Competency Strategy that accesses, develops, employs, and retains world-class engineer leaders who are technically and tactically capable and competent to deliver full-spectrum engineering in the 21st century. To date, there has been incremental but tangible progress that fits into an overall working concept.

Six work groups have been organized to investigate deficiencies and recommend and implement initiatives:

- Future Engineer Missions, Roles, Methods of Delivery
- Accessions
- Training and Education (post-accession)
- Employment
- Retention
- Strategic Communications

Work group responsibilities include assessment of near- and long-term engineer leader capability and competency concerns; recommendation of "quick wins" to improve engineer technical competency; collaboration and sharing of information on future missions, roles, and methods of delivery; standardized definitions of competencies; definition of metrics to measure desired competencies; determination of how to anticipate and shape future work force trends; partnership and communication with other work groups concerning trends, objectives, needs, solutions, and progress.

Initial data collected on Active Army engineer officers (one of the smaller leader groups for which quantifiable data are available) corroborates the perceived decline. There has been a significant decline in the share of Engineer Branch officer accessions with a degree in engineering—from 54 percent in 1998 to 31 percent in 2007. The share of engineer officers with engineering degrees from top-tier schools has declined in recent years—from 30 percent in 1999 to 14 percent in 2007. Engineer technical developmental assignments for officers have declined—installation DPWs have lost military positions, and there are fewer military assignments to USACE. The share of engineer field grade officers with engineering credentials, such as a professional engineering license, has fallen by about a third—from 19 percent in 2002 to 12 percent in 2007.[2] Allied nations and sister Services invest more time educating their officers in technical skills and developmental assignments that enhance technical skills. For example, the Canadian Army equivalent to the U.S. Army's Engineer Basic Officer Leader Course is 24 weeks versus 13 weeks. U.S. Air Force and Navy engineers are held to more stringent standards that mandate engineer technical proficiency.

The current U.S. Army engineer force structure does not facilitate senior engineer mentoring of junior engineer officers and NCOs. For example, there is typically no resident engineer battalion commander/staff to mentor brigade combat team engineer company captains and lieutenants. Additionally, the contemporary operational environment has raised concerns over a decline in officer tactical competency in high-intensity conflict engineer operations. (Much unit-level and predeployment training focuses on fighting counterinsurgencies rather than more conventional enemy forces.) Some investigation has revealed that this challenge is not confined to engineers and is even more pronounced in armor and field artillery.

In addition to the research in defining the challenge, announcing initial Engineer Leader Technical Competency findings and actions has been part of early "flywheel" efforts. This includes visits by the Commandant to engineer students in the Intermediate Leaders Education Course at Fort Leavenworth, Kansas, and to cadets, faculty, and senior leaders at West Point, which have uncovered vigorous offers of assistance. The Commandant has also addressed the issue of engineer leader technical competence at venues such as the Society of American Military Engineers Joint Engineer NCO Symposium, Engineer Precommand Course, Engineer Captains Career Course, 1st Engineer Brigade, and Joint Engineer Operations Course.

A Soldier operates a compact roller to smooth out dirt for roads and parking surfaces.

The Engineer School has also initiated actions that include examining the curricula of the Basic Officer Leader Course and Captains Career Course, the addition of contracting officer representative instruction, and selection processes for instructors. In the Engineer Captains Career Course–Reserve Component, a pilot program restructuring and enhancing project management instruction can result in nationally recognized project management certification. The Engineer School partnership with the Missouri University of Science and Technology has also been enhanced by including Reserve Component students. The flywheel is beginning to turn.

Way Ahead

Engineer Leader Technical Competency is an issue that is broad and deep, since it addresses a capability of the military and the nation. Contributions from all levels of military and civilian engineer leaders are both welcome and needed. A series of briefings, in-progress video teleconferences, and presentations at applicable forums are planned. Obtaining and sharing additional information can be accomplished via Army Knowledge Online (AKO). E-mail Major Mark Conrad at <*mark.aaron.conrad@us.army.mil*> to be added to the access list. Then enter <*https://www.us.army.mil/suite/submitdraft.do?$c=0&$p=504789*> to find a specific working group's point of contact to contribute to this effort. As with many efforts, this is not the primary mission of any individual, but contributions from across the Engineer Regiment in numerous areas of expertise can make a difference and move the flywheel.

Engineer Leader Technical Competency will be a major focus for discussion and breakout groups during the annual ENFORCE conference to be held in St. Louis and Fort Leonard Wood from 4–10 May 2008. The conference theme is "Building Great Engineers" for full-spectrum operations. The book *Good to Great* by Jim Collins will be the theoretical construct. We hope you will engage, write papers, and join us at ENFORCE!

Colonel Meyer is the Director of Training and Leader Development at the United States Army Engineer School, Fort Leonard Wood, Missouri. He is a graduate of the United States Military Academy and has had two tours at West Point. He holds a master's in chemical engineering from the Massachusetts Institute of Technology.

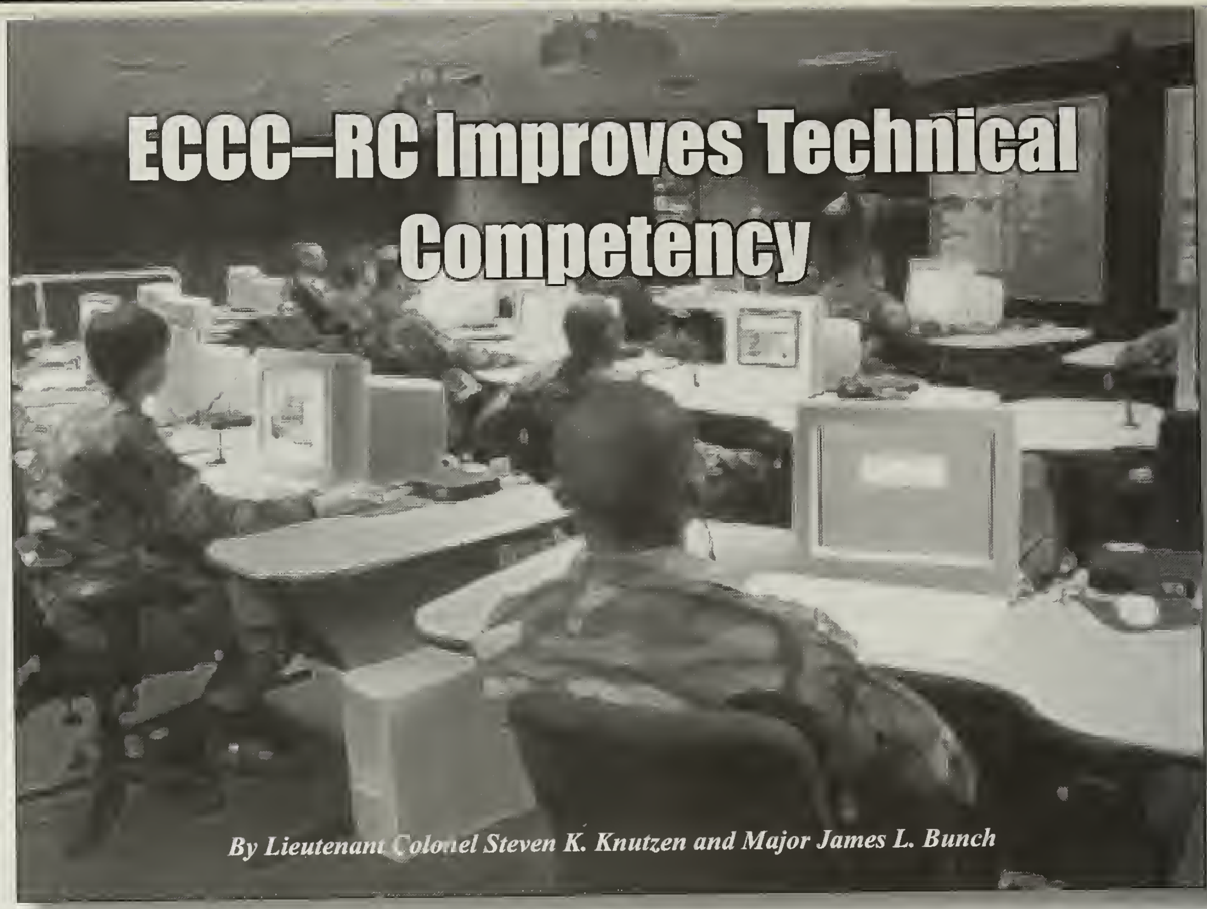
Brigadier General Martin is the Commandant of the United States Army Engineer School, Fort Leonard Wood, Missouri. He has served in a wide variety of command and staff assignments, including instructor duty at West Point and the Army War College and Commander of the 130th Engineer Brigade, during full-spectrum operations in Europe, Kuwait, and Iraq from 2002- 2004. He is a graduate of the United States Military Academy, Command and General Staff College, and the Naval and Army War Colleges. He holds a master's and a doctorate from the Massachusetts Institute of Technology.

Endnotes

[1] Paraphrase from Jim Collins, *Good to Great*, HarperBusiness, New York, 2001.

[2] Statistical data from OEMA.

ECCC–RC Improves Technical Competency



By Lieutenant Colonel Steven K. Knutzen and Major James L. Bunch

Lead the way. The phrase is not new to Reserve Component (RC) engineer officers. As the Regiment continues to support the War on Terrorism, RC officers are expected to be leaders in their communities or industries one day and on the cutting edge of maneuver support and protection operations the next. Army National Guard and United States Army Reserve engineers are now involved in a nation-building and reconstruction effort unlike any since the reconstruction of Europe and Japan following World War II. Technical skills—especially in construction project management (PM) and contract administration—are sorely needed. Since its inception, the United States Army Engineer School has provided an overview of construction methods, and currently does so in its Basic Officer Leader Course, the Engineer Captains Career Course (ECCC), and the Engineer Captains Career Course–Reserve Component (ECCC-RC). Officers in the field have asked for more such training and ECCC-RC is moving to deliver.

Since 13 December 1636, when the oldest Army engineer unit (now designated the 101st Engineer Battalion, Massachusetts Army National Guard) was organized by the Massachusetts Bay Colony, the Engineer Regiment has supported our country with full-spectrum engineer operations. The ability of engineer officers to provide the technical expertise to fulfill the needs of the nation has sometimes been questioned. This has been mainly a process of self-reflection to assess the engineers' abilities and ensure that they can meet operational needs. The Regiment has again reached a point of questioning its ability to meet the technical competencies needed to fulfill today's operational requirements.

ECCC-RC Changes

Two of the engineer technical competency areas being questioned today are—

- PM skills.
- Contracting officer representative (COR) or fiscal responsibility training.

As a result, starting 1 October 2009, the following seven changes to the ECCC-RC will be instituted:

Change 1

Add a COR course to Phase II. A 40-hour block of instruction via distributed learning (dL) will cover the complete COR course, and completion will be required before attending Phase III. All students will receive Army COR certification from this block of instruction. The course will be taught once each quarter via the Engineer School Blackboard system and will have live feedback from the instructor. This instruction is being added without the allocation of any additional resources. We have already received requests from RC officers who are not currently enrolled in ECCC-RC to receive this training, and the staff is working to obtain the resources necessary to implement this training for all RC engineer officers. A pilot course will be conducted during the fourth quarter of fiscal year (FY) 2008, and earlier ECCC-RC graduates will be given the opportunity to participate.

Change 2

Enhance the infrastructure reconnaissance (IR) training during Phase III. A critical task to providing engineer support during stability operations is conducting a thorough IR. Currently, warrant officers receive training on a tool called "It Knows Everything," or IKE, which facilitates rapid integration of IR data, coupled with a reachback capability and reporting and analysis functions. Starting in the first quarter of FY 2009, a full day of IR instruction using IKE will be provided using local community infrastructure. Tasks to be trained are as follows:

- Introduction to IR (2.5 hours)
- It Knows Everything (2 hours)
- Hands-On IR Practical Exercise (5.5 hours)

Change 3

Add 1-hour blocks of instruction on the history of combat engineering and civil works engineering. This will serve as an introduction to the branch to facilitate inclusion of officers seeking branch transfer to the Engineer Regiment. These lessons have already been piloted and will be taught during Phase III, effective immediately.

Change 4

Add an introduction to engineer personnel and equipment to Phase III. A 4-hour overview of engineer equipment and personnel will familiarize officers with the equipment that will be discussed and integrated into tactical plans for the remainder of Phase III. Equipment demonstrations and subject matter expert interaction will be used when possible. This instruction is intended to serve as refresher training to students returning to the Engineer School and as a first-time overview for branch-transfer officers. Full implementation of this training will begin in FY 2009.

Change 5

Restructure and enhance PM instruction. This will align with the Project Management Body of Knowledge (PMBOK) developed by the Project Management Institute (PMI). A 35-hour dL module will be added to Phase IV, along with an optional 35-hour advanced PM module. The training will allow officers to sit for the PMI Certified Associate in Project Management/Project Manager Professional exams to earn certification, depending on PM experience. A pilot course will run during the fourth quarter of FY 2008, and recent ECCC-RC graduates will be notified and invited to participate. Full implementation will begin in FY 2009. New PM topics include the following:

- Introduction to PM (2.5 hours)
- Project Life Cycles and Stakeholders (2 hours)
- Introduction to Project Process Groups and Initiating a Project (1.5 hours)
- Project Planning (2.5 hours)
- Executing, Monitoring, Controlling, and Closing a Project (1.5 hours)
- Initiating a Project and Preparing the Project Plan (2.5 hours)
- Planning Project Scope (1.5 hours)
- Project Scheduling (3.0 hours)
- Estimating Activity Costs (1.5 hours)
- Planning for Quality (2.0 hours)
- Communications Planning and Information Distribution (2.5 hours)
- Planning and Identifying Project Risk (2.5 hours)
- PM Practical Exercise (10 hours)

Change 6

Add 10 hours of "hands-on" PM training and a 12-hour construction capstone exercise to Phase V. PM training will provide reinforcement training to the Phase IV PM instruction through a 10-hour practical exercise using Microsoft® Project and the Theater Construction Management System (TCMS). This will lead into the 12-hour construction capstone exercise, a military decision-making process-driven engineer battalion planning exercise. Additional instruction will also be provided on force protection and environmental laws.

Change 7

Add counterinsurgency/urban operations instruction to Phase V. Training will include the following topics, which will be integrated with the capstone combined arms exercise scenario:

- History of Counterinsurgency (1 hour)
- Urban Intelligence Preparation of the Battlefield (1.5 hours)
- Urban Operations Practical Exercise (3 hours)

Summary

Support of full-spectrum operations requires highly trained RC engineer officers, and ECCC-RC has been updated to meet the growing complexity of the problems faced by the Regiment. Though not the complete answer to the overwhelming requests for more technical training, the revisions to ECCC-RC represent a large step in the right direction. It is an exciting time to be an engineer officer, and RC engineers are leading the way!

For more information about the changes to ECCC-RC, e-mail Major Bunch at <*james.bunch@us.army.mil*>.

Lieutenant Colonel Knutzen is the Deputy Assistant Commandant–Army National Guard, for the United States Army Engineer School, Fort Leonard Wood, Missouri.

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New Opportunity for RC Officers to Earn Engineering Master's Degree

By Lieutenant Colonel Steven K. Knutzen and Major James L. Bunch

It is an exciting time to be an engineer officer. Given the enormous surge in construction in Iraq and Afghanistan, technical skills for engineer officers have never been in greater demand. The United States Army Engineer School at Fort Leonard Wood, Missouri, offers an overview of construction methods in the Basic Officer Leader Course, the Engineer Captains Career Course (ECCC), and the Engineer Captains Career Course–Reserve Component (ECCC-RC). However, many of the technical skills needed to manage complex projects are gained only through civilian education. The Engineer School and the Missouri University of Science and Technology (Missouri S&T) at Rolla, Missouri, provide a way for engineer officers to hone their technical skills.

Since 1984, the Engineer School has partnered with Missouri S&T (formerly known as the University of Missouri–Rolla) to give Active Army officers the opportunity to earn master's degrees in engineering management or civil, environmental, or geological engineering while attending ECCC. Officers are granted eight hours of graduate credit for satisfactorily completing ECCC, which is applied—along with an additional four-credit course taken in the evenings—toward a graduate certificate in either military construction management or military geological engineering. Upon completion of the graduate certificate requirements and ECCC, these officers are allowed to remain at Fort Leonard Wood on permissive temporary duty for 16 weeks to complete the remaining 18 credits required to earn a master's degree. Officers are assessed a special Fort Leonard Wood tuition rate and are not required to pay for the eight hours of shared credit.

Reserve Component Opportunity

Hundreds of Active Army engineer officers have taken advantage of this program since its inception. Now, recognizing the significant number of engineer officers who are in the Army Reserve or National Guard, the Engineer School announces the addition of Reserve Component (RC) officers to the educational partnership with Missouri S&T. The RC programs will be structured similar to the Active Army programs, with the Missouri S&T portion being offered via distributed learning (dL). RC officers will receive eight credits for satisfactorily completing ECCC-RC, which will be combined with a four-credit course offered by Missouri S&T via dL to earn a graduate certificate in either military construction management or military geological engineering. Officers who have an undergraduate degree in either engineering or natural science disciplines will be able to apply the certificate in military construction management toward Missouri S&T's online master of science degree in civil engineering or engineering management and the certificate in military geological engineering toward the master of engineering in geotechnics.

The Missouri University of Science and Technology (Missouri S&T), formerly known as the University of Missouri–Rolla, has provided Active Army officers cooperative degrees since 1984.

Currently, all these programs are being offered online as part of Missouri S&T's Distance and Continuing Education (DCE) program. For these traditional dL programs, officers will be assessed the special Fort Leonard Wood tuition rate

Inspecting dams is a typical task for a geological engineer.

for the four credits required to complete the certificate and will not be required to pay for the eight hours of shared credit. Tuition and fees for the remaining 18 credits will be assessed according to existing DCE policies.

Recognizing that a large number of engineer officers don't have the prerequisites to get into these existing programs, the Missouri S&T Department of Geological Sciences and Engineering has custom-designed a master's degree program in geological engineering for RC officers. In effect, this program will be similar to the traditional dL programs, with two significant differences. First, this program will be assessed the same tuition and fees as the resident Fort Leonard Wood program. It will be offered directly by the Department of Geological Sciences and Engineering via its Blackboard dL platform. Second, the remaining 18 credits will be provided during compressed semesters to allow completion of the entire program within one year. It is the hope of both Missouri S&T and the Engineer School that officers who have not yet earned the degree in engineering or engineering management necessary to work as a facilities/contract construction management engineer will use this opportunity to earn the credential.

Although similar to the programs already mentioned, the custom-designed geological engineering program will be accomplished in three stages:

Stage I

Admission to the Stage I program (graduate certificate in military geological engineering) requires officers to submit an application and provide a copy of their ECCC-RC Phase IV (general engineering) completion certificate, in addition to an

A subsurface exploration class observes a municipal well being drilled in Rolla, Missouri.

official transcript showing proof of having completed at least one semester of college algebra, college chemistry, and either a college biology or physics course. Officers who do not have the prerequisite college courses may be required to take a five-credit bridging course, also provided by the Department of Geological Sciences and Engineering at the same tuition rate, which is included to ensure that every officer will succeed in the program.

Once admitted to the certificate program, officers will be required to complete four credits of online course work, which will be offered during Missouri S&T's normal spring, summer, and fall semesters. Upon completion of the introductory course, officers will be awarded a certificate in military geological engineering. Officers will be given credit for the following courses upon satisfying all Stage I requirements:

- Geomorphology and Terrain Analysis
- Geologic Field Methods
- Engineering Geology and Geotechnics
- Applied Geological Engineering

Officers who have already completed a legacy advanced course or career course will be allowed to participate in the program by enrolling and completing ECCC-RC Phase IV (general engineering) as part of their admission requirements.

Stage II

Officers must apply, but they will be granted acceptance into Stage II of the program without the usual Graduate Record Examination if they complete Stage I with a letter grade of "B" or better. Stage II will consist of completing 15 credits of coursework, of which two three-credit classes will be offered during each special 8-week semester. Stage II courses can be taken in any order, with Stage I completion being the only prerequisite. The following courses will be completed during Stage II:

- Remote Sensing Technology
- Advanced Concepts of Environmental Geological Engineering
- Geotechnical Construction Practice
- Subsurface Exploration
- Subsurface Hydrology

Stage III

Stage III of the program will serve as the capstone exercise and will consist of a three-credit, regular semester course entitled Capstone Project in Geological Engineering. Officers will only be admitted into Stage III during their final semester of study because successful completion depends on knowledge acquired in previous stages.

Engineer officers study rock formations as part of a geological field trip.

Cutting Edge Problem-Solving

As students in the program, officers will have the opportunity to learn about the application of earth science principles to the engineering solution of critical problems facing global society, such as environmental and hazardous waste issues, natural resource protection and energy sustainability, and the design of geotechnical infrastructure such as tunnels, excavations, dams, and waste disposal sites. Geological engineering is a very broad engineering discipline focusing on applications of geology and engineering fundamentals to solve problems. Geological engineers apply their unique set of skills to protect and preserve the environment in which we live, studying geological hazards such as landslides, rock falls, earthquakes, Karst features (which create sinkholes), and dam and levee failures such as those in New Orleans during Hurricane Katrina. Geological engineers are called upon to study and clean up contaminated sites, develop water supply wells, and map hazards using geographical information systems. Across a wide spectrum of global problems, geological engineers are on the cutting edge of engineering problem-solving. For more information on the geological engineering profession, visit the Missouri S&T Geological Engineering website at <*http://web.mst.edu/~gee/*>.

Students gather electrical resistivity data in order to map the subsurface in support of a Missouri Department of Transportation study along a highway south of Springfield, Missouri.

To get started in the program, an RC officer must enroll in and complete the requirements for Phase IV of ECCC-RC. Officers will be briefed about the program during their ECCC-RC resident Phase III and be placed on a list of potential candidates so they can start receiving information regarding the program. Upon completion of ECCC-RC Phase IV, officers can present their Phase IV completion certificate and apply for the graduate certificate program. Once they have completed the introductory course and ECCC-RC, they can apply for admission to the program. Officers will then complete Stage II and Stage III and earn their master's in geological engineering. It is that easy!

Officers interested in the RC programs in the traditional disciplines of engineering management, civil engineering, or geotechnics should contact Lahne Black at <*lahne@mst.edu*> or at (800) 441-5218 or visit the Missouri S&T DCE website at <*http://dce.mst.edu/index.html*>. Officers interested in the custom-designed program in geological engineering should contact the Missouri S&T Department of Geological Sciences and Engineering RC Program coordinator at <*flwgee@mst.edu*> or visit the program website at <*http://mst.edu/~flwgee*>. For questions about ECCC-RC, contact Major Bunch at <*james.bunch@us.army.mil*>.

Future Opportunities

Engineering technical skills training has now been placed at the fingertips of the RC officer, and this is just the beginning. Missouri S&T has agreed to study the possibility of offering similar programs to engineer warrant officers and noncommissioned officers with undergraduate degrees, as well as Department of the Army civilian employees who work as part of the Regiment. These programs will be the subjects of future articles in *Engineer*.

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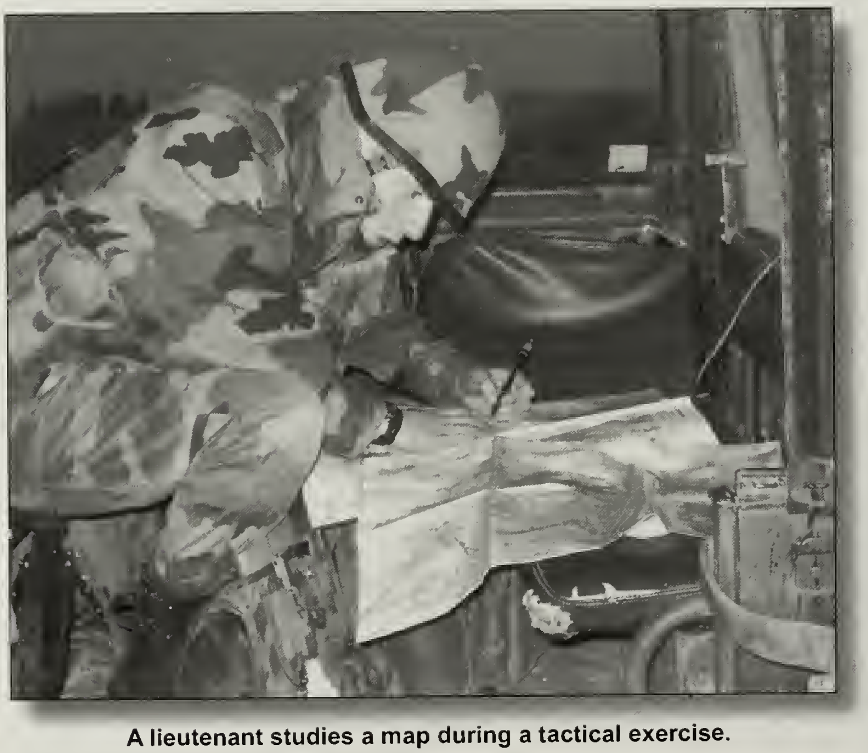
MISSOURI
S&T

Technical Training for Officers in the French Engineer Corps

By Lieutenant Colonel Philippe Potin

The French Engineer Corps, which has a total of about 20,000 active duty sappers,[1] has three components: *combat, security,* and *infrastructure*. These three components are interdependent, and all training for them is done at the Engineer School in Angers, in western France. It is fairly common for an officer to begin his career in a combat unit, go to the Paris Fire Brigade for some time, and then come back to a combat regiment or move to the infrastructure component.

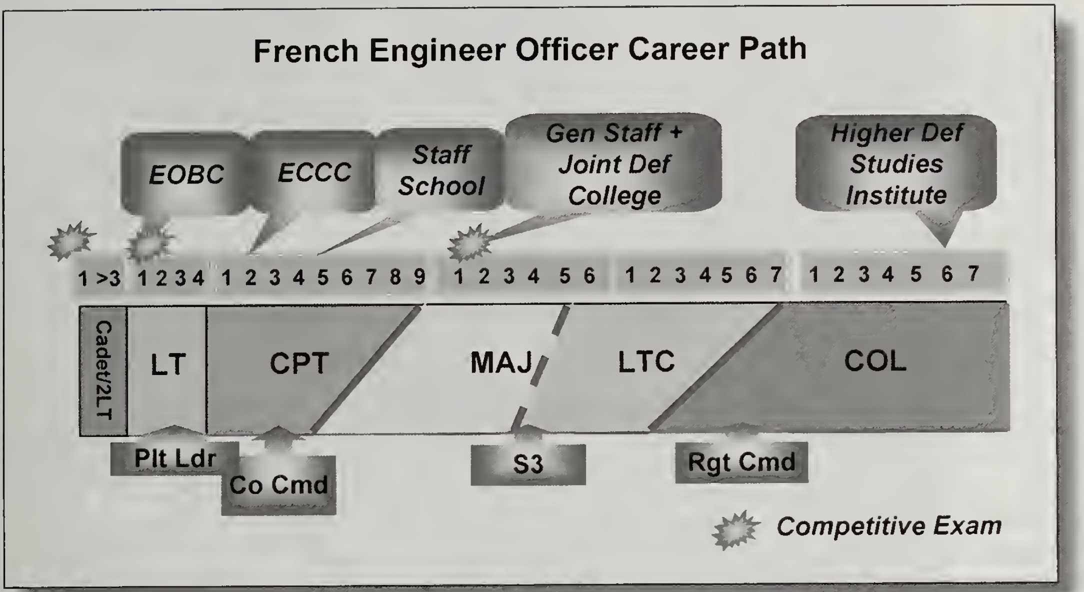

A lieutenant studies a map during a tactical exercise.

The *combat component* (the engineer branch) is under the command of the Army. It consists of twelve regiments—eight embedded in combat brigades, three in the engineer brigade, and one attached to the Air Force. Its mission is to provide direct and general support to the forces.

The *security component* is under the control of the Ministry of Interior, which is broadly equivalent to the Department of Homeland Security. The Paris Fire Brigade (consisting of 8,000 personnel) and the civilian security units (consisting of 2,000 personnel) belong to this ministry. The latter are responsible for disaster relief and support the local firemen. The Fire Brigade has full responsibility for the security of the people in Paris and intervenes in case of fire, accidents, or terrorist attacks.

The *infrastructure component*, which is equivalent to the United States Army Corps of Engineers, has more than 1,000 sappers and the same number of civilian employees. Called *service du génie*[2] or *service*, it is responsible for the infrastructure, construction, and maintenance for the armed services.

The purpose of this article is to explain how the French education system works for engineer officers.[3] But before talking about



specialized training, it is necessary to describe the specifics of officers in the French Engineer Corps.

The Officer Corps

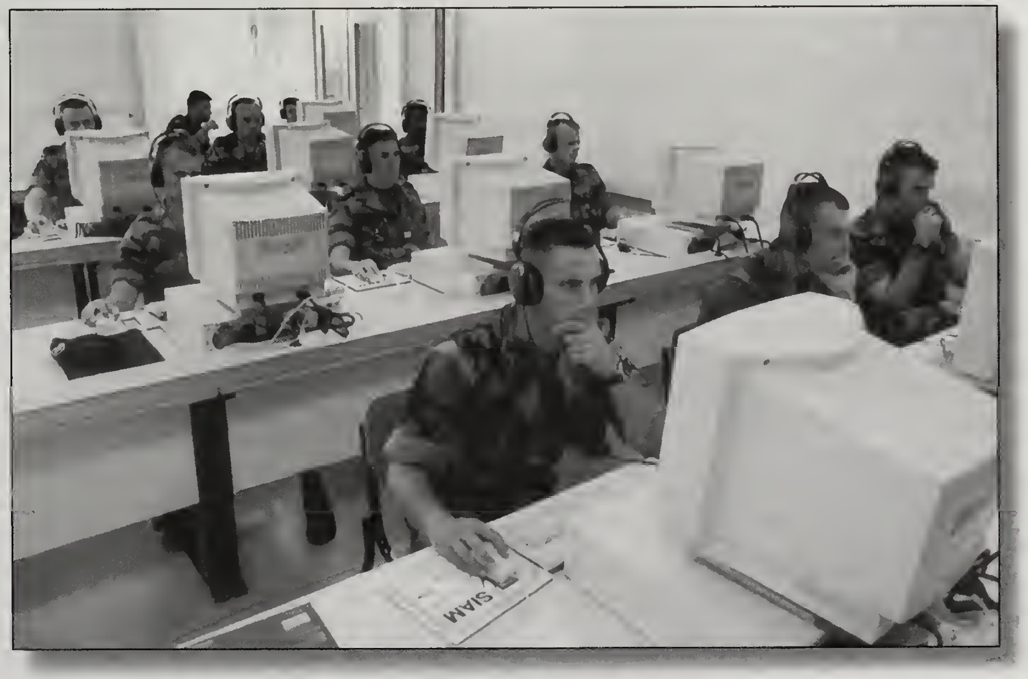
According to Napoleon Bonaparte, "There is a field marshal's baton in every Soldier's knapsack."[4] By this he meant that even a private can aspire to the highest rank. It is not so common now, because there are fewer wars, but some generals come from the enlisted ranks, and more than 50 percent of officers have come from the noncommissioned officer (NCO) corps. Most of them stay in the same domain. It is common to see 50-year-old captains who are former senior NCOs who were promoted late.

For an NCO, it is possible to be promoted to officer at different levels, usually after a selective exam. Junior NCOs spend two years in a different officer academy before going to branch school for basic training, but some other NCOs who are more senior can go directly to the branch school. Senior NCOs are chosen by the Army for promotion to lieutenant, and those officers always stay in their initial specialty.

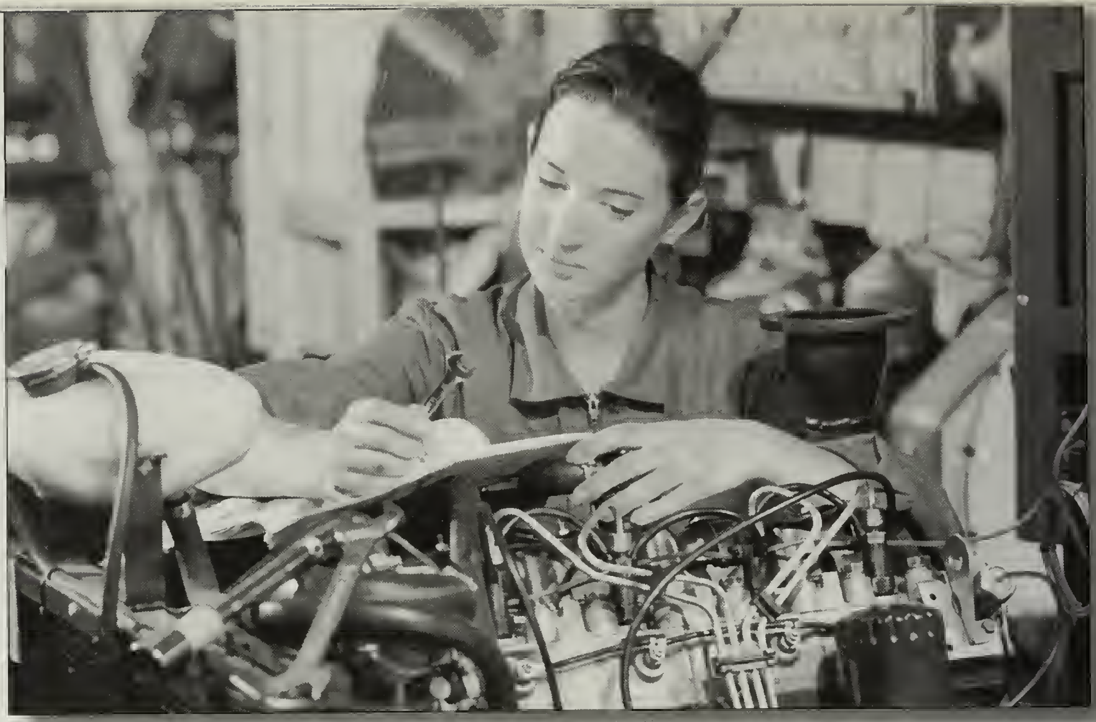
Saint Cyr Military Academy recruits cadets (after they have taken an exam) directly from universities or preparatory classes. Before the exam, it is necessary to spend three years in college or two in preparatory classes. After high school, these preparatory classes prepare a student for the difficult exams, based on mathematics and physics, for entering civilian engineer schools that are called "great schools." These schools, which are considered schools for the elite, are a unique French institution. Although most of them are civil engineer schools in all domains, there are also such schools for business or linguists, and they are completely separate from the universities. Although they are the preferred way to success, they are also the most difficult.

Saint Cyr is a great school, and 40 percent of the cadets who attend there receive a mathematics education. When they finish the 3-year curriculum, they receive a master's degree in general engineering.

In some specialties (lawyers, linguists, architects), officers can be commissioned directly from civilian life if they have the required degree. Their military training is short, 2 to



Online language classes help these officers prepare for promotion.



A young lieutenant works on an engine during a prime power class.

4 months, before these specialists become officers in their domain. They are considered contract officers, rather than career officers like the others. A career officer "owns" his rank, which means he can stay in the Army until the retirement age limit of his rank,[5] even if he is not promoted.

Training for Young Officers

All officers attend basic training at the Engineer School in Angers.[6] The course there lasts 11 months—from September to the end of July. It is a mixture of theory and practical exercises in the field, with the objective of training lieutenants for their first job as platoon leader. The basis of training is combat engineer skills: mobility, countermobility, and survivability. After years of peacekeeping operations all over the world, the emphasis nowadays is much more on demining[7] or force protection than on bridging or obstacles, as it was 20 years ago. The first phase, which lasts for 8 months, gives the students a detailed overview of engineer subjects.

Based on their evaluation, the young officers choose their first assignment at the beginning of the second phase, which lasts for 3 months. Several domains are offered: construction, security, bridging, and combat. Even in the combat domain, there is a place for specialization. The future platoon leader in the Airborne Engineer Regiment goes to jump school. The future diver goes to the Navy Diving Center in Toulon, in the south of France, before coming back to Angers for engineer-specific training. These 1-year courses are not only long but also very demanding. The same is true for students who enter the Paris Fire Brigade, where it takes almost a year to complete all the qualifications required.

This training gives the student a good knowledge of the basic engineering skills required to be a platoon leader. It provides the Engineer Corps with multipurpose officers who are flexible enough to evolve through different jobs, if necessary.

Three or four years later, the officers return to the Engineer School for the captain's course, where the process is similar. During the first 4 months, students focus on the generalities of company command in the context of a combat unit. The 5th month is spent on specialization. Although some training is done on-site, other training is done in units, as it is for security. For specific training in the Fire Brigade, the officers go to Paris. Captains in the Chemical, Biological, Radiological, and Nuclear (CBRN) Regiment, which is now attached to the Engineer Brigade, take the common training in Angers, then move to Draguignan, in the south of France, where the CBRN training center is located to complete the training.

In the first part of his career, until he reaches the rank of major, an officer can follow other specialized courses, such as water treatment or prime power and electricity distribution courses, to fulfill a position. Usually, an officer coming from Saint Cyr does not take such courses because the hierarchy expects this officer to be a future commander, not a specialist. Most of the time, these positions are held by experienced officers who have been commissioned from the NCO ranks and are already specialized in these matters.

Training After Company Command

After company command, there are several ways for officers to continue their career in the Army, depending on the age and the academic level of each officer.

For staff positions, there is the Staff School in Compiègne, north of Paris, where most officers attend a 5-month course just after company command. Then, they prepare for the exam to enter the Staff College in Paris.[8] This is the way to prepare for command positions, except for engineers. For an engineer officer with a scientific education, there is another exam—which is based on mathematics and called the *brevet technique* (BT) or technical brevet—that an officer must pass to enter one of the famous great schools in civil engineering.

For the Engineer Corps, this is the preferred way because it provides qualified officers not only for regimental commands but also for district commands in the *service*. This integration in a civilian school can last from 1 to 3 years, depending on the school and the curriculum chosen. Afterwards, this officer joins his colleagues in the Joint Staff College in Paris.

Only a minority of officers will follow this path, because most do not have a high enough academic level to pass the exams. But even if an officer fails this type of exam, his career is not finished. There are several other career possibilities, especially for engineers.

The *service* offers a lot of positions at different levels: surveyors, crew chiefs, project managers, and district and division commanders. It has no Soldiers, only NCOs and officers,[9] and they all come from combat units. The *service* is also open to officers coming from other branches, with the only condition being that they pass the exam.

The *certificate technique* (CT) or technical certificate is for captains. This 1-year course, which is taught in Angers, provides infrastructure officers for the regiments.[10] At a higher level is the *diplôme technique* (DT) or technical diploma, which is reserved for captains or majors with a good background in sciences (a university degree, for example). In 2 years, they can earn a master's degree in vertical construction. If an officer already has a master's degree, he can obtain this master's in only 1 year. After these courses, officers join the *service* to work in staff positions or as project managers. The best officers can expect to command a district.

If an officer fails, he still can drop one level below his current level—for example, from BT to DT or from DT to CT. All of these courses are taught at the Engineer School in Angers. This system provides the *service du génie* with the highly professional workforce it needs. For officers who were rejected or not attracted to command positions in their branch, this system offers new opportunities to continue a career in a very different but essential domain. If for any reason the engineer officers decide to leave, they will have little problem finding a job in the construction industry with their technical training.

Conclusion

Since the end of World War II, the French Army has built a complex but complete system of professional training for officers. It is still evolving[11] to adapt to changes in the Army and in society. The main disadvantage is the length of time that the average officer spends in schools.[12] Although it is a heavy load, it is the only way (especially in the Engineer Corps) to have experienced and qualified officers who are flexible enough to adapt to any position. This lengthy training is possible because officers stay on duty longer—they can receive a minimum pension only after 25 years of duty.[13] The unemployment rate is still high in France, and it is not easy for the average officer to leave the Army and find a job. Consequently, most of them choose to stay in the Army family. This system is a good investment for the Army. Although the courses take a lot of time, the officers remain in these specialized positions long enough to make the system viable and durable.

Lieutenant Colonel Potin is the French Liaison Officer to the United States Army Maneuver Support Center, Fort Leonard Wood, Missouri. He was previously assigned to the French Engineer School in Angers as officer in charge of digitization and computer simulation systems. Other assignments include military assistant for the chief of staff of the Stabilization Force (SFOR), Bosnia; instructor for tactics in the Engineer School in Angers, and training company command in the 6th Engineer Regiment in Angers. He is a graduate of "Ecole Spéciale Militaire de Saint Cyr," the French Military Academy; the Engineer Officer Advanced Course, Fort Leonard Wood; and the Belgian Staff College in Brussels. He also holds a master's in construction engineering from the "Ecole Nationale des Ponts et Chaussées" in Paris.

Endnotes

[1] In France, reserve forces are small: one company for each regiment, for about 1,000 sappers total.

[2] The infrastructure component is called *"service du génie"* or *"service"; génie* is the French word for engineer.

[3] For more details, contact the author at Fort Leonard Wood : LTC Potin, (573) 563-4027 by telephone, or by e-mail at <*philippe.potin@us.army.mil*>.

[4] This is an approximate translation of the original: « *tout soldat a dans sa giberne son bâton de Maréchal* ».

[5] For a lieutenant colonel, it is age 57.

[6] About 70 lieutenants every year: 20 from Saint Cyr, 25 from the officer academy for NCOs, 10 from the NCO corps, 5 from diverse origins, and 10 international students.

[7] In 2007, improvised explosive device (IED) defeat was integrated in the program.

[8] The Staff College lasts 2 years: 6 months in the Army Superior Staff School, 6 months in overseas operation as a staff officer, and 1 year in the Joint Staff College in Paris.

[9] In 2007, there were 500 officers.

[10] There is 1 position for each regiment, or 100 total. He is responsible for maintaining the infrastructures in a regiment and conducting minor construction projects in liaison with the local engineer district.

[11] The last reform, which was in 2007, is too recent to observe the consequences on the Engineer Corps.

[12] I spent 8 years in courses, for 21 years on active duty.

[13] To receive the maximum pension an officer needs to serve more than 30 years, especially if he has no bonus from operations or specific assignments.

Leadership and Technical Development in the Corps of Royal Engineers

By Colonel Andrew W. Phillips

I have been asked to write this article to support the current review of technical competence in the United States Army Engineer Regiment. In the article, I will describe the United Kingdom's (UK's) approach to developing the leadership and technical skills of the Royal Engineer (RE) officers and noncommissioned officers (NCOs), and then explain how the UK's military engineering capability is configured on operations. My purpose is not to suggest that the UK's approach is necessarily an applicable model for the U. S. Army engineers to adopt—far from it, since our history, ethos, missions, and size differ so markedly. However, I hope that by offering an alternative perspective on developing and managing engineer capability, I am able to contribute to the current debate.

Overview of the Royal Engineers

Key Facts

To place the article into context, it is first worth highlighting a few facts about the Royal Engineers:

- **Size.** At just under 9,000 strong, the Corps constitutes approximately 9 percent of the Army. In recent operations, however, it has comprised 15–25 percent of any deployed force, and the motto "First In, Last Out" has never been more applicable.
- **Joint Approach.** The RE mission is to provide engineer support across defense. In any deployment, the joint task force commander has an RE advisor, as does each component commander. The level of engineer support allocated to each component is mission-dependent and is controlled at the operational level.
- **Military Engineering Focus.** In the late 1950s, UK peacetime civil works responsibilities were transferred from the Royal Engineers to a civilian agency. As a result, the Corps's primary focus over the past 50 years has been the delivery of engineer support to military operations.
- **Full-Spectrum Engineer Capability.** All RE Soldiers are multiskilled—they are Soldiers, combat engineers, and artisan tradesmen. A UK engineer battalion[1] therefore has the flexibility to switch from a combat engineer mission to a construction engineer mission without the requirement to reorganize or re-equip.
- **Specialist Capabilities.** The Corps has regiments that provide specialist engineer capabilities in air assault, commando, explosive ordnance disposal (EOD), search, geographic, and air support (fixed and rotary wing). Infrastructure engineering tasks at the more demanding end of the technical spectrum are undertaken by deployable works groups made up of Specialist Teams Royal Engineers (STREs).

The full-spectrum engineer capability that the Corps delivers is illustrated by the three triangles in Figure 1.

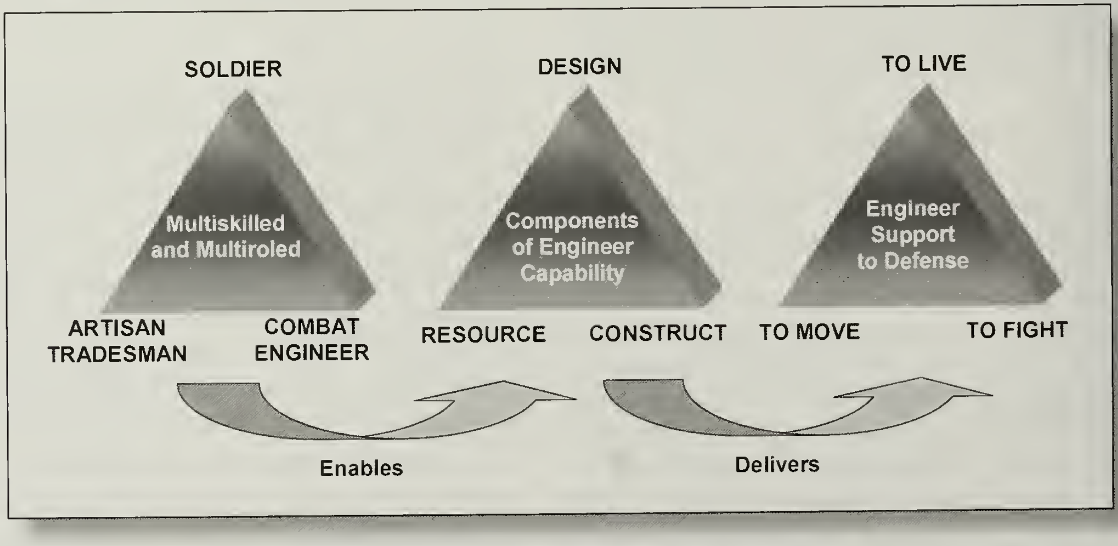


Figure 1. Full-Spectrum Engineer Capability

Royal Engineer Officer Training

Junior Officer Training

The RE officer intake traditionally consists of approximately 5 percent nongraduates, 35–40 percent engineer graduates, and 55–60 percent non-engineer graduates. All officers, regardless of their academic qualifications, undertake a year of officer training at the Royal Military Academy Sandhurst (RMAS), followed by the 27-week Royal Engineer Troop Commanders' Course (RETCC) at the Royal School of Military Engineering (RSME). The RETCC is designed to equip junior officers with the skills required to command an RE troop, and the course consists of the following modules:

- 11 weeks of combat engineer training that covers the reconnaissance, planning, and management of combat engineer tasks.
- 7 weeks of construction training that covers basic engineering principles, project management, and aspects of health and safety. This phase is predominantly classroom-based but includes practical elements such as temporary camp reconnaissance and the use of earthmoving equipment.
- 1 week of communications training.
- 9 weeks of command and leadership training that builds on the education received at RMAS and concludes with a 2-week confirmatory field training exercise.

Officer Appointments

Career Stage 1 encompasses the first 10 years of an officer's career—from initial appointment to promotion to major. On completion of 18 months of initial training, junior officers normally undertake an initial tour commanding a field troop and a subsequent tour commanding a troop or platoon in the training organization. The generic junior officer career structure also includes a provision for up to 6 months of officer development (leading an adventurous training expedition or humanitarian project, for example), although operational commitments mean that few young officers are currently able to exploit such opportunities. On completion of the second junior officer tour and promotion to captain, officers normally fill either an adjutant or squadron[2] executive officer (XO) billet, and the officer's final tour as a captain is normally as a Grade 3 staff officer in either an engineer or all-arms headquarters.

Command and Staff Training

Upon being selected for promotion to major and entering Career Stage 2, all officers attend the all-arms Intermediate Command and Staff Course (Land) at the UK Defence Academy. This training prepares officers for Grade 2 staff appointments and sub-unit command which, in the British Army, is a field rank appointment. Thereafter, a proportion of officers selected for promotion to lieutenant colonel (Career Stage 3) attend the Joint Advanced Command and Staff Course in preparation for Grade 1 staff appointments and battalion-level command.

Specialist Officer Training

The generic officer career development profile described above is applicable to all officers in the Corps, less those who undertake specialist training to provide the professionally qualified engineers that the Corps needs to sustain its infrastructure and geographic capabilities.[3] Annually, 12 senior captains/junior majors (representing approximately 20 percent of the total peer group for that year) are trained as chartered engineers (CEng) in either the construction or the electrical and mechanical disciplines. Professional Engineer Training (PET) lasts approximately 2 years, and the courses are broken down as follows:

- 7 months of postgraduate study at the RSME: revising principles; developing design, planning, and contractual skills; and gaining a broader knowledge of military infrastructure engineering.
- 9 months with a civilian contractor.
- 8 months with a civilian consultant.

Officers who have completed the PET course are then eligible to command an STRE (the technical sub-unit), although it is not unusual for the higher-caliber PET officers to command a mainstream sub-unit, either instead of or in addition to an STRE. Following sub-unit command, PET officers are eligible to be employed either in mainstream or technical staff appointments, but if they are promoted to lieutenant colonel on the technical roster, then they are limited to employment within the technical field for the remainder of their career. Specialist officers have the opportunity to command one of the four RE works groups, and the pinnacle of the CEng career pyramid is to command the infrastructure support engineer group—a colonel's billet.

The generic officer career model up to sub-unit command, highlighting the developmental progression achieved at each stage, is shown in Figure 2, page 20.

Royal Engineer Soldier Training

Initial Soldier Training

Initial training for all RE Soldiers is broken into 3 phases:

- Phase 1: 10 weeks of basic Soldier training.
- Phase 2A: 10 weeks of combat engineer training.
- Phase 2B: 6–15 months of Class 2 artisan trade training, the length of the course being dependent on the Soldier's trade.

Follow-On Training

Having completed initial training—sometimes lasting as long as 18 months—Soldiers normally serve 3–5 years in their first unit. During this tour, they normally complete a junior

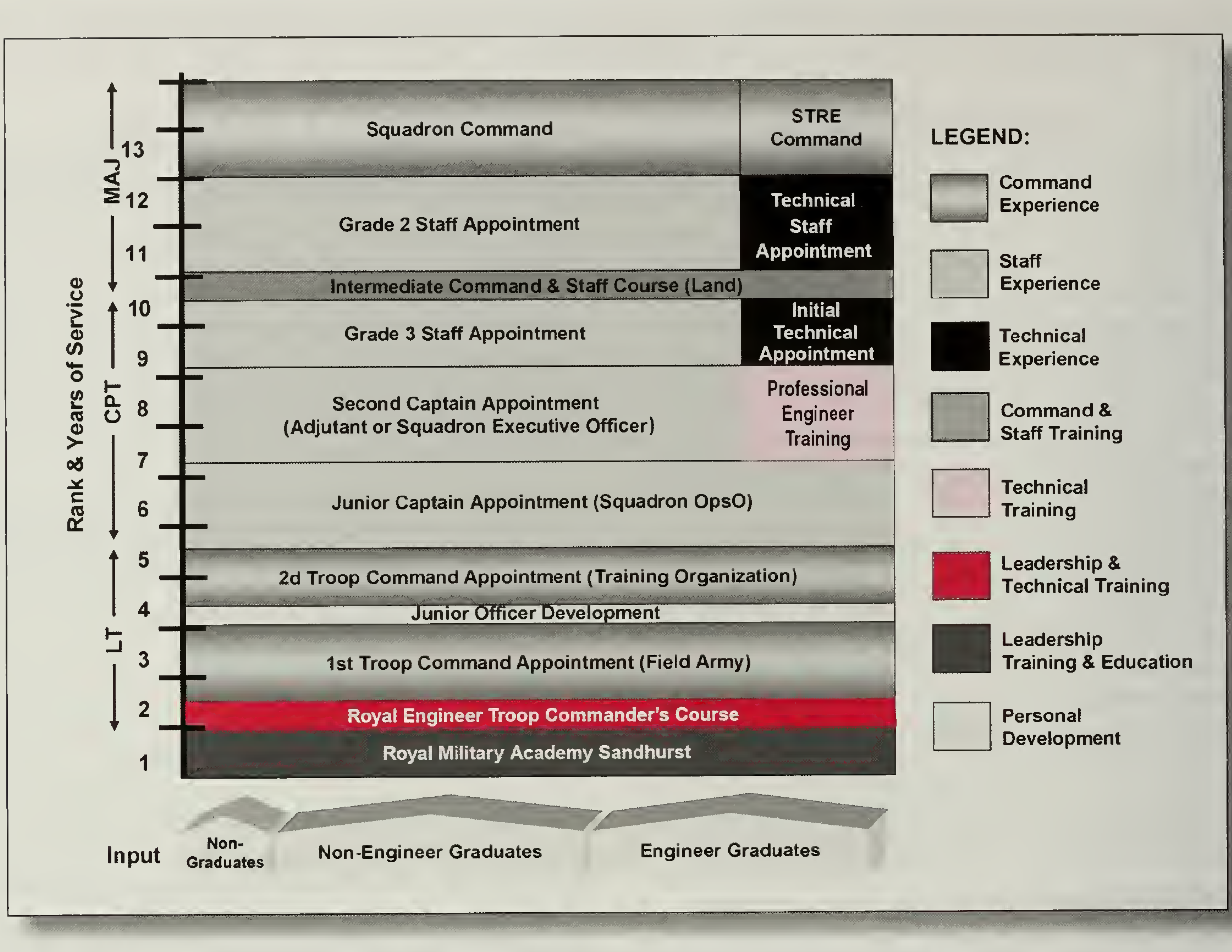

Rank & Years of Service
MAJ
CPT
LT
13
12
11
10
9
8
7
6
5
4
3
2
1
Squadron Command
STRE Command
Grade 2 Staff Appointment
Technical Staff Appointment
Intermediate Command & Staff Course (Land)
Grade 3 Staff Appointment
Initial Technical Appointment
Second Captain Appointment (Adjutant or Squadron Executive Officer)
Professional Engineer Training
Junior Captain Appointment (Squadron OpsO)
2d Troop Command Appointment (Training Organization)
Junior Officer Development
1st Troop Command Appointment (Field Army)
Royal Engineer Troop Commander's Course
Royal Military Academy Sandhurst
Input
Non-Graduates
Non-Engineer Graduates
Engineer Graduates
LEGEND:
Command Experience
Staff Experience
Technical Experience
Command & Staff Training
Technical Training
Leadership & Technical Training
Leadership Training & Education
Personal Development

Figure 2. Generic Royal Engineer Officer Career Progression Model

NCO (JNCO) leadership cadre to determine their suitability for promotion; thereafter, they are required to complete both generic and occupational-specific command, leadership, and management courses at each stage of their career as a prerequisite for further promotion. All RE Soldiers must also gain a Class 1 artisan trade qualification and a Class 1 combat engineer qualification before being eligible for promotion to corporal. Class 1 trade courses last about 6 months, and Soldiers identified as having technical aptitude are then considered for clerk of works training.

Clerk of Works Training

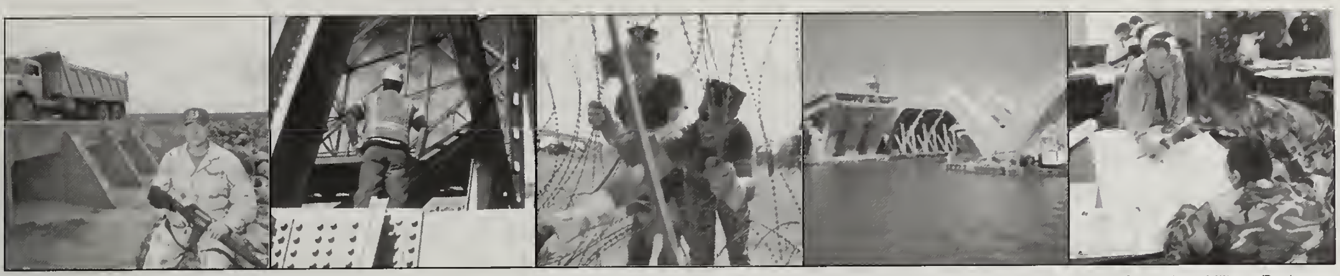
The RSME has the capacity to train up to 24 JNCOs/senior NCOs (SNCOs) per year to become clerks of works construction,[4] electrical, or mechanical. Clerks of works are responsible for planning and managing technical projects and for providing detailed technical advice in their specialist field. The Clerk of Works Course is just under 2 years in length and comprises 4 months of science and math, 18 months of engineering design, and a 6-week attachment to industry. All clerks of works are promoted to staff sergeant on completion of the course and have a clearly defined career path to warrant officer Class 1, with a very strong chance of commissioning thereafter.

Engineer Support to Operations

Close and General Support Engineering

Engineer support to a maneuver brigade is provided by a close support (CS) engineer regiment (a U.S. battalion equivalent). The regiment lives and trains with the brigade in peacetime and, in addition to commanding the unit, the commanding officer is also the brigade commander's engineer advisor. As already highlighted, a CS engineer regiment is able to provide full-spectrum support to the brigade, from high-intensity combat engineer operations at one end to CS infrastructure engineering at the other. Engineer support at the divisional level is provided by a general support (GS) engineer regiment, and all the engineer assets with the division are commanded by a Commander Royal Engineers (CRE), a colonel who is the divisional commander's engineer advisor. It is worth noting that the current configuration for engineer support (CS and GS/engineer regiment supporting a brigade) was introduced in the early 1990s when it became apparent that the existing structure, which entailed an engineer squadron (a U.S. company equivalent) supporting a brigade, was unable to deliver the level of engineer advice, or the concentration of engineer capability, required by all-arms units and formations.

(Continued on page 27)



Photos courtesy Society of American Military Engineers

JOINT ENGINEERING STRATEGY

By Major John P. Lloyd

The president's 2006 National Security Strategy (NSS) stressed a policy to seek and support democratic movements and institutions in every nation and culture. The NSS is founded on two pillars:

- To promote freedom, justice, and human dignity; work to end tyranny and encourage effective democracies; and extend prosperity through fair trade and wise development policies.
- To confront today's challenges by leading a growing community of democracies.[1]

An important element in fulfilling and shaping the pillars of the NSS in the international environment is the operational effectiveness of joint military engineers in conducting combat operations and humanitarian assistance. Trends from the conflicts in Iraq and Afghanistan and from the past decade show that the United States—together with its international partners—must have the capacity to manage two or three reconstruction and stabilization operations concurrently.[2]

Joint military engineers have a long history of heavy engagement in activities such as United States Southern Command's Operation Fuertes Caminos, a wide range of assistance to Panama, and the responses to the 2004 Indian Ocean tsunami and 2005 Pakistan earthquake. Engineers provide civic assistance, support, stability and reconstruction operations, development projects for critical infrastructure, and the further development of the natural resources of other countries. Engineers from all the military Services provide unique capabilities in all these endeavors and are well-suited to organize and execute these missions to fulfill the NSS.

To accomplish this, joint military engineers must develop a supporting strategy to become increasingly flexible, thus providing the full spectrum of military engineering required by leaders from the president down to the joint task force commander. Joint military engineering is unique in that it can operate and support strategic, operational, and tactical objectives. Unlike any other group, joint military engineers typically support and enable both operational and sustainment functions, as well as all the instruments of national power. To be more effective, the number of military engineers should be increased, and a reorganization of engineer commands should be considered.

Successful strategic military joint engineering can be seen in Iraq today with the United States Army Corps of Engineers (USACE) Gulf Region Division (GRD). The mission of the GRD and its partners in the Naval Facilities Engineering Command (NAVFAC) and Air Force Civil Engineer Support Agency (AFCESA) is to provide high-quality, responsive, full-spectrum engineering services in Iraq in support of military and civil construction, logistical services, and aggressive assistance to the Iraqi government so it can assume full responsibility for national reconstruction.[3]

Joint Engineers as Shapers

Using the joint military engineer force to shape the international community can be extremely effective in fighting poverty, increasing economic growth, and promoting democracy by helping governments make better use of their own countries' resources. Engineers shape the security environment by supporting the combatant commander's vision. They engage other nations by working with allies, as well as potential coalition partners, by participating in international exercises and supporting stability operations in foreign countries. Engineers can often lead combatant commander engagement initiatives through ministry-level contact, military-to-military contact, instruction, and construction projects.[4] For example, USACE was designated by the Department of Defense (DOD) to be the executive agent in extinguishing the oil fires in Iraq during the 2003 invasion. USACE was able to extinguish a number of oil fires during initial operations and has since awarded contracts to sustain Iraq's oil infrastructure, which is the country's main economic resource.[5] The National Response Plan also identifies USACE as the primary agency for providing Emergency Support Function #3-2 (technical assistance, engineering, and construction management resources and support during response activities).[6]

Historic Joint Military Engineering

Joint military engineering has been involved in every major conflict from World War II to present-day operations in Iraq and Afghanistan. It also assisted with Hurricane Katrina recovery efforts and is involved in Homeland Security.

World War II

During the 6 June 1944 Normandy invasion, the United States Navy Seabees were among the first to go ashore as members of naval combat demolition units. Working with United States Army engineers, their primary task was to destroy the steel and concrete barriers that the Germans had built in the water and on the beaches to forestall Allied amphibious landings.[7]

Vietnam

Based on a 1965 memo from Robert S. McNamara, Secretary of Defense, to Harold Brown, Secretary of the United States Air Force, a study was conducted that led to the development of the United States Air Force Prime Base Engineer Emergency Force (Prime BEEF) units.[8] These units worked alongside United States Army and Navy engineers to build or improve airfields that supported strategic bombings in North Vietnam. Projects included improved beddown and maintenance facilities for crews and aircraft.

Haiti

In September 1994, the 20th Engineer Brigade from Fort Bragg, North Carolina, deployed to Haiti as Task Force Castle, a joint military engineer task force. The brigade conducted a number of decisive engineer operations that included the construction of base camps, restoration of electrical power directly benefiting the local populace, construction of a landfill on Soleil, refurbishment of an academy for the International Criminal Investigators Training Assistance, construction of a marketplace that supported hundreds of vendors, improvements to local schools, and removal of garbage as part of the national cleaning fervor in Haiti.[9]

Bosnia

Military engineers played a major role in Bosnia with the initial bridge construction across the Sava River, which allowed 1st Armored Division forces to enter the country. The 1st Armored Division Engineer Brigade formed a joint military engineer task force that built more than 24 base camps to support the 28,000 North Atlantic Treaty Organization (NATO) peacekeeping forces monitoring the Dayton Accords. Engineers supported the NATO mission by improving roads and removing explosive hazards such as mines and unexploded ordnance.

Tactical and Technical Implementation

The national strategic engineering assets of USACE, NAVFAC, and the Air Force Center for Engineering and the Environment (AFCEE) will be vital in implementing the NSS. The increased capability of the Office of the Secretary of State/Office of the Coordinator for Reconstruction and Stabilization (S/CRS) will allow for an integrated civilian and military response that is agile, flexible, scalable, and able to build on lessons learned. According to Joint Publication 3-34, *Joint Engineer Operations*, USACE and NAVFAC are the principal engineer organizations to plan, design, construct, and acquire facilities and real estate for DOD.[10] Joint military engineering will play a vital role in supporting the Department of Homeland Security and its three national priorities of preventing terrorist attacks within the United States, reducing America's vulnerability to terrorism, and minimizing the damage and facilitating the recovery from attacks that might occur.[11]

Joint military engineers support this strategy by working with organizations such as United States Northern Command's Joint Task Force North to prevent transnational threats to the homeland. This includes using engineer units for construction along the Mexico-U.S. border to increase law enforcement's ability to fight illegal drugs. It also assists law enforcement agencies with combating illegal immigration, as outlined in Chapter Eight of the 2006 NSS. Joint Task Force North's engineering and surveillance projects have contributed to hardening the border, and halting "alien smuggling organizations" is among its stated goals. It provides a model for the kinds of projects the National Guard will be expected to undertake as the Bush administration implements its controversial plan to strengthen the southern frontier. One such project can be found in the hills east of San Diego, California, where active duty United States Marine Corps engineers teamed with a Maryland Army National Guard unit to build an access road.[12]

The border security and illegal immigration issue remains a top strategic issue for the United States and Mexico. The National Guard is playing a huge role in border security. The United States depends on the National Guard—especially its engineer forces—as part of the Total Force concept. More than 60 percent of the military's engineer force resides in the National Guard and Reserves, and they will continue to be a strategic asset in improving the nation's borders. National Guard officials in San Diego say that much is being accomplished, and they point to engineers who are working on projects such as a secondary border fence. In the next year, they are scheduled to build drainage structures and a stretch of all-weather road in the western part of the San Diego border area; gates and fencing in the eastern portion; and fencing at Campo, about 60 miles east of San Diego.[13]

Conclusion

Joint military engineers bring unique capabilities that support reconstruction efforts and nation-building along with all other elements of national power. Military engineers are experienced at interagency support and in leveraging nonmilitary and nongovernmental engineer assets to support mission accomplishment.[14] While transformation has reduced much of the military engineer forces, a strategy must be developed to ensure that military engineer capabilities are maintained and that joint force commanders understand the employment of those capabilities. Joint military engineers must develop a strategy that supports the way ahead as outlined by the administration's strategy in Chapter 4 of the NSS. This strategy includes three levels of engagement:

- Conflict prevention and resolution.
- Conflict intervention.
- Post-conflict stabilization and reconstruction.

Chapter 9 focuses on the same strategy in the way ahead in improving the capability to plan and respond to post-conflict situations.[15] The S/CRS is responsible for integrating U.S. government resources and assets, including military engineers. Military engineers must continue to work closely with the Department of State to achieve national objectives. The S/CRS identifies two goals for engineers:

- Be responsive to immediate needs, which is the assessment of existing facilities for post-conflict needs.
- Establish the foundation for development, which includes the construction of facilities to promote governance, commerce, and social well-being.[16]

As the S/CRS continues to grow, its capability will bring added value in developing policy and strategy for reconstruction efforts. The S/CRS currently has one USACE liaison assigned to its staff and will need to expand the numbers of its military members to ensure that capabilities and resources are managed across the full spectrum of contingencies from civil war to natural disaster. An S/CRS representative would be a vital member in the joint military engineer headquarters as an interface with in-country teams who understand host nation reconstruction capabilities.

Just as DOD is increasing the number of Special Forces operators and units, it should study the joint military engineer force and increase the number of units and engineers in all the military services. Like the Special Forces, military engineers provide support across all six phases of an operation and provide tactical, operational, and strategic engineering to the president, combatant commanders, and joint task force commanders. The Quadrennial Defense Review and follow-on Strategic Planning Guidance emphasized the need to continue to build on DOD's capability-based planning and management. The Joint Operational Engineer Board may need to develop a joint military engineer strategy as it builds the Capability Portfolio Management for Operational Engineering. To maximize effectiveness, DOD may need to develop an "Engineer Command" that is similar to the proposed "Medical Command" that would combine the medical capabilities of all the Services into one command.[17] Doing so would ensure that military engineers would be able to significantly contribute to the achievement of national goals by overseeing and coordinating the effects of engineer forces from all Services.

Major Lloyd is the senior operations officer for current operations for MNC-I, Iraq, and XVIII Airborne Corps, Fort Bragg, North Carolina. Other assignments include Commander, 175th Topographic Engineer Company, Fort Bragg; 14th Combat Engineer Battalion, Fort Lewis, Washington; 20th Engineer Brigade, Fort Bragg; and deputy maneuver support trainer, Fort Irwin, California. He is a graduate of the Engineer Officer Basic and Advanced Courses and the Joint Advanced Warfighting School and holds a master's in joint campaign planning and strategy from National Defense University.

Endnotes

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[3] USACE website <*http://www.usace.army.mil/*>, Accessed 18 October 2006.

[4] FM 3-34, *Engineer Operations*, 2 January 2004, pp. 1-16.

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[8] Red Horse History, <*http://www.globalsecurity.org/military/agency/usaf/red-horse.htm*>.

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[10] Joint Publication, (JP) 3-34, *Engineer Doctrine for Joint Operations*, Government Printing Office, 5 July 2000.

[11] NSS, 2006. p. 43.

[12] Stew Magnuson, "Troops Use Frontier for Real-World Training," *National Defense Online*, July 2006, <*http://www.nationaldefensemagazine.org/issues/2006/july/TroopsUseFrontier.htm*>.

[13] *San Francisco Chronicle*, "National Guard Works the Border," <*https://webnet.jfsc.ndu.edu/http/0/ebird.afis.mil/ebfiles/e20061024aaindex.html*>.

[14] FM 3-34, pg. 1-2.

[15] NSS, 2006. pp. 15-16, 44-45.

[16] Department of State Office of Reconstruction and Stabilization website at <*http://www.state.gov/s/crs/*>.

[17] *Navy Times*, "Medical Merger," 25 September 2006, pp. 14-15, 31.

THE JOINT ENGINEERING WAY AHEAD

By Ms.Rachel M. Walkenbach

Current theater operations necessitate the integration of all Service engineers if full-spectrum joint engineer functions are to be attained. From combat to general engineering, our engineer Services are sharing the battlefield and expanding their capabilities to address a broad range of planning and execution efforts. Joint engineer planning can include simultaneous planning for an extreme range of engineer requirements, to include—

- Combat mission planning support.
- Improvised explosive device (IED) defeat.
- Base camp planning and development.
- Contingency contracting.
- Infrastructure assessment.
- Reachback capability utilization.
- Construction management.
- Contractor and industry relations.
- Reconstruction and stabilization engineer operations, including joint interagency, intergovernmental, and multinational (JIIM) support.
- Humanitarian operations support.

Joint engineer planning is the key to bridging the gap in full-spectrum engineer operations. Engineering capabilities from across the Services are uniting to bring high degrees of expertise to theater mission planning. Engineers are no longer able to maintain Service-centric focus areas. The entire theater is now the focus. Thus, it requires an expanded engineer knowledge and skill base, increased training, and the ability to execute large-scale theater operations. Current engineering missions indicate a demand of such magnitude that it will require all U.S. engineer forces to support the joint mission. The force multiplier in joint engineer theater operations is having technically and tactically competent engineers who comprehend the expertise and capabilities the joint engineer Services and their civilian counterparts bring to bear.

Joint Training Initiatives

The "way ahead" for joint engineering identifies training and education gaps and promotes the integration of new programs throughout the Services. Engineers from all ranks and echelons of operations are identifying the joint requirements and training gaps throughout multiple theaters. The Joint Engineer Training and Education Working Group, composed of engineer training and education leaders from across the Services, is working to mitigate these gaps by discussing key joint engineer considerations and the mechanisms to program and integrate them into our training and education systems. These senior leaders then take these considerations and recommendations for joint application to the Joint Operational Engineering Board (JOEB) to support the effort to update existing—or implement future—joint engineer programs. The joint initiatives will help integrate theater lessons learned and practical applications into our Services' training and education systems with a joint perspective and formalized education. This senior working group has generated five initiatives that address gaps within training and education and joint organizational leadership of engineers and point the way ahead in joint engineering:

- Joint Engineer Training
- Engineer Leader Competency
- Joint Engineer Training and Education Center of Excellence
- Construction Leader Exchange Program
- Military and Industry Strategic Alliance Program

Joint Engineer Training

In-theater, the joint task force (JTF) engineer cells are using the capabilities of our engineering assets from the joint perspective. JTF engineer senior leaders, planners, and mission executors are expected to understand the varied capabilities of joint engineer assets and the roles of civilians on the battlefield with them. Joint training encompasses aspects

"The intent is to implement a greater 'joint context' into collective, individual, and staff functions to enable engineers to meet theater operational requirements."

of planning, synchronizing, disseminating, and executing the mission. The JOEB established the Joint Engineer Operations Course (JEOC) to answer the call for joint engineer training. (See article on page 26 for a JEOC overview.) Designed for noncommissioned officers, warrant officers, and officers, JEOC teaches future JTF engineer participants the primary elements for joint staff organization, Service engineer capabilities, general engineering, and outside-the-wire considerations. JEOC is a two-phase course with a 40-hour Distributed Learning (dL) Phase open to all engineers at any time for self-development and also serves as the prerequisite for the 1-week Resident Phase course, exercising joint engineer comprehension and planning. Beyond JEOC, a wealth of joint engineer resources and opportunities await. The efforts of the Joint Engineer Training and Education Working Group are identifying the future of joint engineer training programs and mitigating gaps to establish more effective joint engineer programs and better reachback capabilities.

Engineer Leader Competency

Engineers are required to perform simultaneous combat and general engineering mission planning while maintaining the joint perspective. For those who are both planning and executing the operational mission, the engineer knowledge requirements are expanding. To prepare our forces for full-spectrum engineer operations, engineers need more cross-Service engineer training and formalized civil engineer education and training to perform joint duties with technical competency. The forward movement for our engineers integrates civil engineer degree programs or professional technical certifications into the military curricula, thus establishing technically competent engineers. Achieving engineer leader competency requires establishing Service engineers with a civil engineer education and technical performance skills. They must possess the ability to—

- Comprehend the engineering capabilities of the joint Services.
- Participate in facilities engineering and infrastructure planning.
- Conduct base camp design and planning.
- Utilize construction management programs.
- Execute contingency contracting and procurement requirements.
- Establish diplomatic relations.
- Utilize large-scale construction planning knowledge for outside-the-wire missions.

These skills require the accuracy of formal training and expertise of joint experience in theater operations. The Service engineer institutions recognize this requirement and are answering the call to provide support to combatant commanders with trained professionals.

Joint Engineer Training and Education Center of Excellence

The Joint Engineer Training and Education Center of Excellence (JENTEC) concept is derived from the Joint Center of Excellence concept and would serve as the training and education center for joint engineer training programs. The intent is to implement a greater "joint context" into collective, individual, and staff functions to enable engineers to meet theater operational requirements. The purpose of the JENTEC is to provide joint engineer Service input and oversight to joint programs with participation and recommendations to the JOEB and coordinating working groups. The JENTEC would encompass three engineering directorates—the Joint Engineer Combat Directorate, the General Engineering Training Directorate, and a Joint Education Directorate—to manage the joint engineer courses. Senior engineer training and education leaders would oversee joint training and education. They would support the establishment of organizations, develop and maintain existing programs established to support multi-Service and joint training agreements, and establish and maintain joint accredited engineer military education.

JENTEC would offer full-spectrum joint training opportunities to train engineers and civilian counterparts in all aspects of joint engineering. Joint training should include—

- Combat leader and training courses.
- Accredited joint engineering dL and resident courses.
- Assignment-oriented training.
- Joint construction management programs.
- Joint base camp planning and development programs.
- Engineer support to JIIM operations.

The JENTEC would also support Interservice Training Review Organization (ITRO) growth and provide a joint staffing process for the joint and ITRO organizations.

Construction Leader Exchange Program

The Construction Leader Exchange Program is being designed for enlisted personnel, warrant officers, and officers to establish expert engineers. They will be capable of providing engineer support within combat situations and horizontal and

(Continued on page 46)

Joint Engineer Operations Course Overview

By Ms. Rachel M. Walkenbach

The joint engineer community continues to move forward in the process of educating and preparing its officers and noncommissioned officers for operations in the joint environment. The Joint Engineer Operations Course (JEOC), which was designed by engineers for engineers, will bring together engineers from all the Services. Not only will they use what they learn in the current operational environment, but they will also use it for future applications to meet the challenges faced by engineer forces of the 21st century.

The need for the JEOC is based on guidance from the *National Military Strategy, Quadrennial Defense Review*, February 2006, and the Chairman of the Joint Chiefs of Staff's *CJCS Vision for Joint Officer Development*, as well as from other sources. The joint engineer community has set its sights on developing engineers who are better prepared and who can quickly immerse themselves into the joint task force (JTF) and its ongoing campaign.

Course Description

The JEOC is a two-phase course designed for selected engineer officers (senior 0-3s and junior 0-4s), senior noncommissioned officers, warrant officers, and government civilians who may serve on a joint staff.

Distributed Learning Phase

The JEOC Distributed Learning (dL) Phase is open to all engineers for self-development in JTF engineer operations. It is a self-paced, self-development course consisting of current information in support of joint engineer operations. Joint engineers from across the Services and from combatant commands abroad have participated in the development of this course and its resources. An Army Knowledge Online (AKO) account is required for enrollment, but joint Service members will be sponsored for an AKO account in order to enroll in the course. The dL Phase is designed to be 40 to 48 hours and, although there is no obligation for completing the course after enrollment, a dL course certificate (good for one year after completion) is a prerequisite for attending the second phase, which is the Resident Phase. A student may elect to complete the JEOC dL Phase only, but the interaction and collaboration with students of other Services at the Resident Phase play a big factor in the success of JEOC.

The dL Phase consists of seven modules with associated lessons that introduce the student to—

- National Security Strategy Development.
- Joint Operations Planning.
- Joint Engineer Capabilities.
- JTF Engineer Staff Operations and Planning.
- Theater Engineer Operations.
- Joint Engineer Considerations and Relations With Joint Interagency, Intergovernmental, and Multinational Organizations (JIIM).
- Joint Environmental Considerations.

JEOC Dates and Locations

7-11 April 2008
Fort Leonard Wood, Missouri
U.S. Army Engineer School (USAES)

2-6 June 2008
Wright Patterson AFB, Ohio
Air Force Institute of Technology (AFIT)

17-21 November 2008
Quantico, Virginia
HQ, U.S. Marine Corps
Marine Corps University

Resident Phase

The JEOC Resident Phase primarily consists of facilitator-led small-group discussions and associated practical exercises (PEs). Integrated throughout the course agenda are seven JTF engineer seminar discussions via video teleconference (VTC), guest speaker or panel discussions, and social activities with guests from specialized engineering fields.

The seven seminars are aligned with PEs built around likely JTF scenarios. Students must demonstrate their knowledge and ability to apply joint Service engineer capabilities, common functions, and responsibilities of a JTF engineer staff officer or noncommissioned officer in a simulated JTF engineer staff environment to develop a joint engineer solution. The seminars and practical exercises are—

- Service Engineer Capabilities.
- Engineer Support Plan.
- JTF Assignments, Functions, and Roles.
- Horizontal Staff Integration.
- Engineer Functions.
- Facilities Engineering and General Engineering.
- Outside-the-Wire Considerations.

The Resident Phase guest speakers and topics are as follows:

- Combatant Command Engineer – Area of Responsibility (AOR) Briefing
- Theater JTF Engineer Perspectives and Lessons Learned
- Coalition Engineer Panel (A, B, C countries)
- JTF Engineer Observations and the Effects-Based Approach to Operations
- Senior Engineer (JS-J4) Theater and Joint Engineer Considerations
- Geospatial Engineering Capabilities Presentation
- Sourcing and the Request-for-Forces (RFF) Process
- Base Development and Planning
- Environmental Considerations for the JTF Engineer
- Senior Engineer Brief (Service Engineer Chief)
- Improvised Explosive Device (IED) Defeat Presentation
- Engineer Support to Joint Interagency, Intergovernmental, and Multinational (JIIM) Operations
- Office of Foreign Disaster Assistance – Engineer Roles in Disaster Operations
- Contractors on the Battlefield
- Defense Support to Civil Authorities (NORTHCOM)

Enrollment in the Resident Phase of JEOC is based on priority, considering the fact that only 45 students can be accommodated per course. Top priority goes to personnel assigned to a JTF, combatant command, or component command. Second priority goes to personnel with a high probability of being assigned to a joint billet. Third priority is for other personnel who would benefit from attending JEOC.

Summary

The course provides sufficient grounding for students to understand the responsibilities of a staff officer assigned to the joint engineer staff section of a JTF. The major focus of the course is to introduce students to joint doctrine, planning and operations (specifically engineer operations), and the types of engineer staff positions and associated products engineers are required to develop.

All engineers are encouraged to enroll in the Joint Engineer Operations Course. For questions pertaining to enrollment, contact Mr. Dwayne Boeres at the Directorate of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri 65583. He can also be reached at <*dwayne.boeres@us.army.mil*> or (573) 563-7065.

Ms. Walkenbach is a contractor with C2 Technologies, Inc., and works in the Directorate of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri.

“Royal Engineers,” continued from page 20)

Infrastructure Support Engineering

Infrastructure engineering support to the joint force is provided by the infrastructure support engineer group. The group comprises four works groups, each of which consists of five STREs of various disciplines (materials, works, water development, bulk petroleum, utilities, water infrastructure, power infrastructure, fuels infrastructure, rail infrastructure, and port infrastructure). Although predominantly made up of active duty personnel, there is also a reserve component that provides specialist expertise in civilian infrastructure and utilities. The role of the works groups on operations is to conduct professional and technical assessment, design, planning, and supervision of infrastructure engineering tasks, including the use of contractors and locally employed civilians when required. This use of small, stand-alone deployable teams—combining professional engineers, technician engineers, technicians, design trades and, in certain teams, specialist trades—has proved to be highly successful in recent operations.

Summary

Given the constraints of space, it has only been possible to give a broad overview of the capabilities of the Royal Engineers in this article, and there are some elements of the Corps's capabilities that I have not addressed at all. However, I hope that I have been able to provide an insight into the way in which the British Army develops and manages its military engineer capability and that this insight is informative in the context of the current debate. By way of conclusion, it is worth noting that the UK's recent review of future army structures has resulted in a significant increase in the size of the Royal Engineers and, furthermore, that this increase has largely been achieved at the expense of the combat arms. This clearly illustrates the value that UK Defense places on its engineer capability, and it will ensure that the Corps can continue to uphold its motto of *Ubique* (everywhere).

Colonel Phillips is the British Liaison Officer at the United States Army Maneuver Support Center, an appointment which he took up in October 2007. Prior to this, he was the officer career manager for the Royal Engineers, and previous appointments include Commanding Officer at the Royal School of Military Engineering and Commanding Officer of the Army Technical Foundation College. He also commanded the UK's Joint EOD Force on the entry operation into Kosovo.

Endnotes

[1] In the British Army, an engineer battalion is designated as a "regiment."

[2] A UK engineer company is designated as a "squadron."

[3] The geographic capability will not be discussed in this article.

[4] The construction field also includes the discipline of military plant foreman.

Photo courtesy U.S. Air Force

GATOR:

EOD COUNTER-IED TRAINING

By Senior Master Sergeant Mike Hague

The 1/101 Brigade Combat Team (BCT) Operations Center receives an urgent call from a mounted combat patrol, Rough Rider element, in the city of Kirkuk, Iraq, requesting immediate explosive ordnance disposal (EOD) team response. The Operations Center relays to the EOD team that during the course of a coalition presence patrol in downtown Kirkuk, a convoy of five up-armored HMMWVs was struck by an improvised explosive device (IED); the lead vehicle took the force of the blast, resulting in minor injuries to the occupants and minimal vehicle damage. The Operations Center immediately dispatches its on-call quick-reaction force to escort the EOD team to the incident scene. Once at the scene, the on-site convoy commander provides the EOD team chief with a detailed description of the events that led to the attack and a sketch of the scene. The EOD team chief ensures that 360-degree site security is in place and that all coalition and local national personnel in the area are safely evacuated. The EOD team uses robotic equipment to quickly do a remote survey of the vehicle damage, explosion site, and surrounding area. They find an animal carcass with electrical wires coming out of it, obviously emplaced by insurgents as a secondary IED meant to kill or injure the first-responders. Using a robot, the EOD team destroys the secondary IED by placing an explosive charge on the carcass. The site is cleared and the EOD team is escorted back to the forward operating base (FOB)—another mission success.

Photo courtesy U.S. Air Force

EOD robots have proved to be invaluable on the battlefield.

Photo courtesy U.S. Air Force

A team member watches in the mirror of the new EOD Cougar Armored Response Vehicle as another EOD journeyman prepares explosive charges.

This realistic scenario is just one of many that Air Force EOD teams encounter during a Global Antiterrorism and Operational Readiness (GATOR) Course. The two-week course, held at the Ordnance Munitions and Electronic Maintenance School, Redstone Arsenal, Alabama, is required predeployment training for EOD forces. The course provides training on IED threats and unique EOD procedures and equipment encountered in Iraq and Afghanistan.

GATOR is owned and operated by the United States Army, which established the course in 2003 to enhance the training its EOD forces received before deploying for Operation Iraqi Freedom or Operation Enduring Freedom. The Army conducts more than 30 GATOR classes per year, training well over 500 EOD technicians from all Services, as well as EOD teams from other countries. The permanent GATOR staff consists of four Active Army EOD instructors and a team of contract support personnel who build IED training aids and maintain specialized robotics and equipment. Each Service provides additional subject matter experts to assist the GATOR staff while their Service teams attend the course.

GATOR's joint Service training venue allows Air Force EOD teams to train as they will fight on the joint Service battlefield. Week one consists of classroom training on current enemy tactics, techniques, and procedures (TTP); IED trends; advanced IED electronics; electronic countermeasures; Iraq/Afghanistan ordnance identification; crime scene investigation/forensic analysis; and robotic equipment operations. During week two, students respond to more than 30 practical scenarios based on current EOD incidents and evolving insurgent TTP.

The GATOR course is just a part of the required training EOD forces must have before heading to the Iraq and Afghanistan areas of operations. They must also complete Air Force predeployment training at home station and a 15-day basic Combat Skills Training Course at one of the Army's stateside power projection platforms. This is all in addition to their normal schedule at home station. EOD forces spend more than 30 percent of their time in training—to maintain their minimum career field qualifications, to hone their wartime skills, and to stay proficient on specialized EOD tools and TTP.

It's a lot of training, but the execution of EOD operations on the Iraqi and Afghani battlefields requires unwavering skill to ensure the safety and survival of coalition forces and local nationals. The GATOR Course provides exceptional hands-on classroom training and challenging practical scenarios built from actual EOD operations occurring in-theater within the past few months.

Senior Master Sergeant Hague is the Air Force EOD Operations and Training Program Manager, Headquarters, Air Force Civil Engineer Support Agency, Tyndall Air Force Base, Florida.

Note: A version of this article was published in the Air Force *Civil Engineer* magazine, Volume 15, No. 2, pages 12-13.

Engineer Operational Manuals Update

By Lieutenant Colonel Barry Supplee (Retired) and Lieutenant Colonel Edward R. Lefler

This article provides an update on the status of the Engineer Regiment's keystone manual—Field Manual (FM) 3-34, *Engineer Operations*—and the ongoing development of its two subordinate and companion manuals, FM 3-34.22, *Engineer Operations – Brigade Combat Team and Below*, and FM 3-34.23, *Engineer Operations – Echelons Above the Brigade Combat Team*. These are significant revisions of the doctrine for engineer operations supporting all echelons from company teams and task forces to theater armies.

Status of FM 3-34 and the Way Ahead

The final draft (FD) of FM 3-34 was staffed "worldwide," and 340 comments were received. The writing team is adjudicating all comments and preparing the "approved" FD for editing. Once editing is completed, the manual will begin its final staffing through the United States Army Engineer School commandant, the United States Army Maneuver Support Center commander, and then to the Combined Arms Doctrine Directorate of the Combined Arms Center at Fort Leavenworth, Kansas, before it is published and posted on Army Knowledge Online (AKO). The publication of this latest version of FM 3-34 is projected for early fall of 2008. The completed version of FM 3-34 will be the 21st edition of our engineer keystone operational manual, with the first one being printed before 1897. (See *Engineer*, January-March 2007, page 4.)

Development of FM 3-34.22 and FM 3-34.23

FM 3-34.22 is a new manual that will encompass engineer operations doctrine for all three types of brigade combat teams (BCTs)—heavy, infantry, and Stryker—and their primary subordinate units. It will supersede the following manuals, and the information contained in them will be revised and consolidated in the new manual:

- FM 3-34.221, *Engineer Operations – Stryker Brigade Combat Team*, dated 7 January 2005
- FM 5-7-30, *Brigade Engineer and Engineer Company Combat Operations*, dated 28 December 1994
- FM 5-71-2, *Armored Task-Force Engineer Combat Operations*, dated 28 June 1996
- FM 5-71-3, *Brigade Engineer Combat Operations (Armored)*, dated 3 October 1995

FM 3-34.22 reflects the considerable changes that have occurred over the 14-plus years since all of these manuals were released. While many of the tactical tasks associated with combat and general engineering support have remained essentially constant, the operational environment has dramatically shifted. New focused threats such as improvised explosive devices (IEDs) are but one example of those changes. Another major change involves the Army's reorganization and restructuring to the modular force and the effects that this has had on doctrine and the conduct of operations.

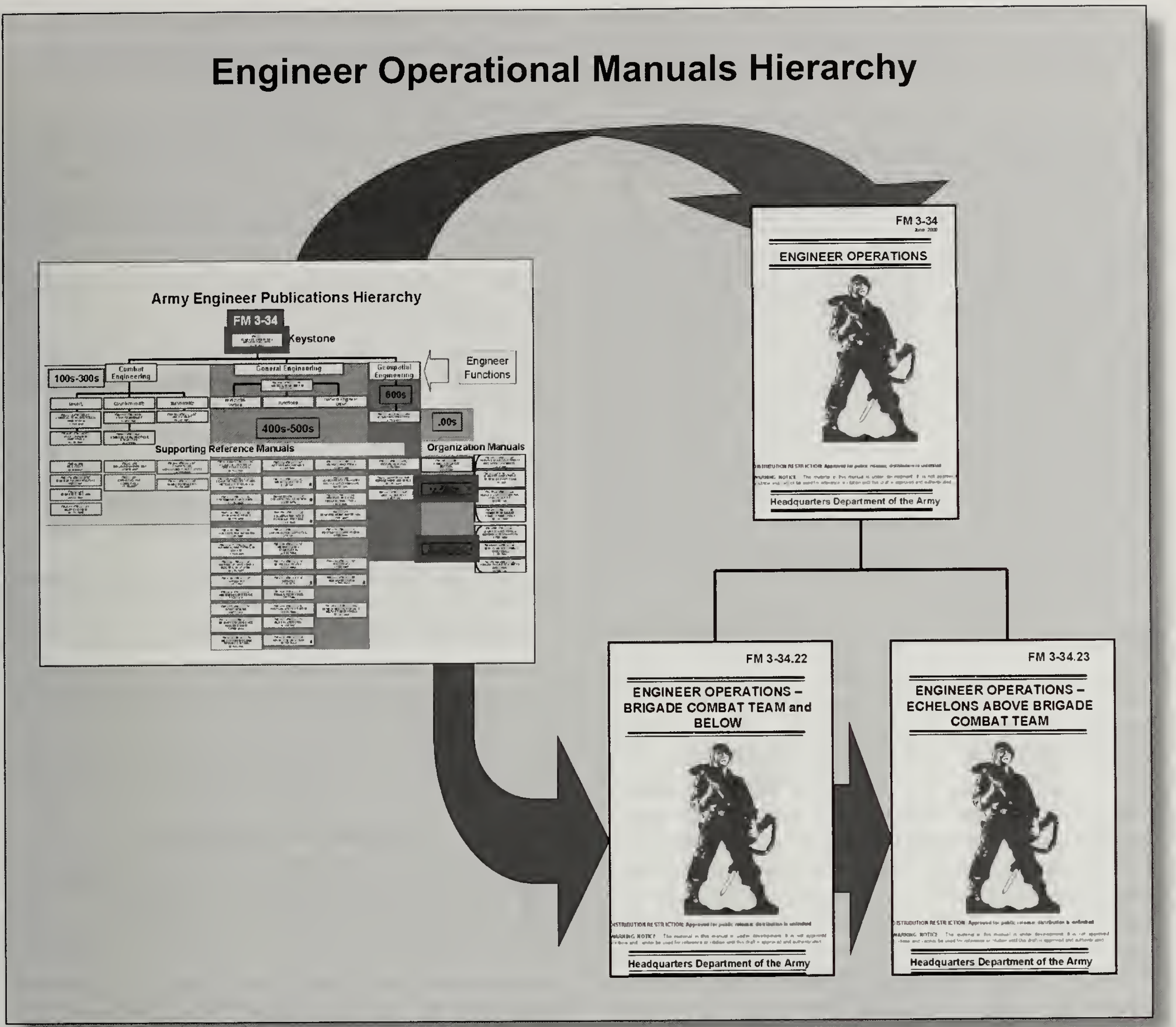
FM 3-34.23 is a new manual that will supersede the following manuals and will combine doctrine previously published in them:

- FM 5-71-100, *Division Engineer Combat Operations*, dated 22 April 1993
- FM 5-100-15, *Corps Engineer Operations*, dated 6 June 1995
- FM 5-116, *Engineer Operations: Echelons Above Corps*, dated 9 February 1999

Just as Army transformation has flattened higher-echelon structure into modular, scalable capabilities, this manual flattens the associated engineer doctrine for these echelons for greater effectiveness and efficiency.

The intent of these two new FMs, with consolidated and revised material from the superseded manuals, is to establish doctrinal guidance for the employment of engineers and the conduct of engineer operations supporting full-spectrum operations. These manuals will support the doctrine articulated in the newest version of FM 3-0, *Operations*, dated 28 February 2008. Each of these manuals will link directly to the revised FM 3-34, as well as each other, and also complement joint engineer doctrine found in Joint Publication (JP) 3-34, *Joint Engineer Operations*, dated 12 February 2007. These engineer manuals will serve as references for commanders and staff, leaders, training developers, and doctrine developers throughout the Army and the joint, interagency, intergovernmental, and multinational (JIIM) community.

The development of these manuals is being led by the engineer doctrine team, which includes writers who are former engineer officers, available subject matter experts from the Army Engineer School and around the Regiment, as well as the community of combined arms doctrine developers to review and comment as drafts are staffed.


Engineer Operational Manuals Hierarchy
Army Engineer Publications Hierarchy
FM 3-34
Keystone
100s-300s
Combat Engineering
General Engineering
Geospatial Engineering
Engineer Functions
600s
400s-500s
.00s
Supporting Reference Manuals
Organization Manuals
FM 3-34
ENGINEER OPERATIONS
Headquarters Department of the Army
FM 3-34.22
ENGINEER OPERATIONS – BRIGADE COMBAT TEAM and BELOW
Headquarters Department of the Army
FM 3-34.23
ENGINEER OPERATIONS – ECHELONS ABOVE BRIGADE COMBAT TEAM
Headquarters Department of the Army

Senior engineer leader input from across the Regiment is critical to the development of each of these manuals. Also critical is the use of a targeted working group of senior engineer leaders for focused guidance and reviews as the manuals are developed. Most of the development of each manual is being done virtually, primarily through e-mail correspondence and AKO. Targeted discussion of the latest drafts of both manuals occurred prior to ENFORCE 2008 (5-9 May) through a virtual Council of Colonels conducted via video teleconference (VTC).

Need for FM 3-34.22 and FM 3-34.23

There are many reasons driving the requirements for these manuals. Some of the reasons to consolidate and update them are that the Army, and we as engineers in particular, have had significant recent operational experiences through our participation in ongoing operations in Afghanistan and Iraq, as well as other worldwide operations (such as in the Philippines and Hurricane Katrina relief). In addition to FM 3-34, the following key joint and Army manuals have been recently revised or are under revision:

- JP 3-0, *Joint Operations*, dated 17 September 2006
- JP 3-15, *Barriers, Obstacles, and Mine Warfare for Joint Operations*, dated 27 April 2007
- JP 3-34, *Joint Engineer Operations*, dated 12 February 2007
- JP 5-0, *Joint Operation Planning*, dated 26 December 2006
- FM 3-0, *Operations*, dated 28 February 2008
- FM 3-90, *Tactics*, dated 4 July 2001
- FM 5-0, *Army Planning and Orders Production*, dated 20 January 2005

- FM 6-0, *Mission Command: Command and Control of Army Forces*, dated 11 August 2003
- FM 7-15, *The Army Universal Task List*, dated 31 August 2003
- Field Manual Interim (FMI) 5-0.1, *The Operations Process*, dated 31 March 2006

The collective body of evolving policy and doctrine, coupled with joint and Army transformation impacts on the Engineer Regiment, led to development of and conversion to the modular engineer force structure. To remain relevant and current, it is imperative that engineer doctrine remains synchronized with the prevailing body of thought for the Army. Doctrine is increasing focus and emphasis on stability operations, coupled with the recognition that the Army conducts simultaneous full-spectrum operations. Revised doctrine recognizes the impacts of conducting multiple operations simultaneously and with distinctly different objectives for forces in the field, the revised force structure and how it is employed, and the modified way that the Army conducts its operations.

Another significant doctrinal change is the deletion of the Battlefield Operating System (BOS) construct and the development and adoption of Army warfighting functions. Adoption of the warfighting functions and revisions to the elements of combat power make it necessary to revise our thoughts on engineer operations and integrate them through warfighting functions. In addition to functional brigades, transformation to the modular force has led to the creation of three types of maneuver BCTs and five multifunctional support brigades designed to provide support to the division level. (They are the Maneuver Enhancement Brigade [MEB], Battlefield Surveillance, Combat Aviation, Sustainment, and Fires Brigades.) The MEB conducts maneuver support operations which enhance protection and mobility through variable mixes of forces—such as engineer; military police; chemical, biological, radiological, and nuclear (CBRN); and explosive ordnance disposal (EOD)—conducting combined arms operations. When engineer units are assigned or attached to an MEB, many of their traditional combat and general engineer missions will be executed in the context of maneuver support operations for the supported force.

All of these changes are driving significant content adjustment in these manuals, to include a crosswalk of linkages from the three engineer functions of combat, general, and geospatial engineering to the six warfighting functions. The Army warfighting functions, which were first introduced in FMI 5-0.1, replace the BOS construct in the new FM 3-0, link to the joint functions, and will be reflected in the revised version of FM 3-34. The new FM 3-34 will highlight and describe the criticality of engineer staff integration at all echelons and the importance of functional, as well as multifunctional, command and control for engineer elements. The manual recognizes the transformation to a modular BCT-focused Army and describes engineer capabilities within that context. In conjunction with these changes, the manual also updates integration into the Army and joint planning processes, to include considerations in the rapid decision-making and synchronization process.

FM 3-34.22 and FM 3-34.23, which are intended to be companion manuals to FM 3-34, will complement and integrate other recent and ongoing doctrinal updates within the engineer doctrine proponency as well. These manuals include the following:

- FM 3-34.210, *Explosive Hazards Operations,* dated 27 March 2004
- FM 3-100.4, *Environmental Considerations in Military Operations* (will be republished as FM 3-34.500/MCRP 4-11B)
- FM 5-103, *Survivability Operations* (will be republished as FM 3-34.300/MCWP 3-17.6)
- FM 5-104, *General Engineering Operations* (will be republished as FM 3-34.400/MCWP 3-17.8)
- FM 5-170, *Engineer Reconnaissance* (will be republished as FM 3-34.170/MCWP 3-17.4) and the related infrastructure reconnaissance
- FM 90-13, *River Crossing Operations* (will be republished as FM 3-90.12/MCRP 3-17.1, *Combined Arms Gap Crossing Operations*)

These updates to doctrine should be available on AKO within the year.

Framing of the Manuals

The development of FM 3-34.22 leverages foundational changes made during the development of FM 3-34.221. This new FM further aligns doctrine for engineer operations at the BCT and below echelons with evolved doctrine for all three types of BCTs and specifically FM 3-90.6, *The Brigade Combat Team*, 4 August 2006; FM 3-90.61, *The Brigade Special Troops Battalion*, 22 December 2006; and the recently released FM 3-90.5, *Combined Arms Battalion Operations*.

To avoid doctrinal redundancy in the manual, it references FM 3-90.6 for the general discussion on BCT operations, while focusing on engineer aspects at that level. It also references FM 3-34 for discussion of an engineer view of the operational environment and modular engineer capabilities and references FM 3-34.170 for detailed discussion on engineer reconnaissance capabilities. FM 3-34.22 will be framed in eight chapters:

- Chapter 1: Engineers in Support of the Brigade Combat Team – describes the role of engineers and engineer support to the BCT, as well as specific engineer organization within the BCT.
- Chapter 2: Integrating Engineer Operations – describes processes to integrate engineer operations within the BCT.

- Chapter 3: Engineer Support to Intelligence, Surveillance, and Reconnaissance – describes engineer reconnaissance in support of BCT ISR operations.
- Chapter 4: Engineer Support to Security Operations – describes engineer support of BCT security operations.
- Chapter 5: Engineer Support to Lethal and Nonlethal Fires – describes the integration of engineer support to targeting and civil affairs operations.
- Chapter 6: Engineer Support to Combat Operations – describes integration of engineer support in BCT offensive and defensive operations.
- Chapter 7: Stability and Civil Support Operations – describes integration of engineer support in BCT stability or civil support operations.
- Chapter 8: Sustainment Support for Engineer Operations – discusses the considerations for sustainment of engineer units and operations supporting the BCT.

In addition to the chapters, a number of appendixes will be included in the manual to provide additional detailed discussion for a variety of selected topics.

The development of FM 3-34.23 currently precedes the development of other new higher-echelon manuals that are likely to be designated as FM 3-91, FM 3-92, and FM 3-93 for division, corps, and theater army echelons. The new FM 3-34.23 flattens the body of doctrine for engineer operations at echelons above the BCT from three separate manuals into a single manual. To avoid doctrinal redundancy in the manual, it references FM 3-34 for discussion of an engineer view of the operational environment (OE) and details on modular engineer capabilities. The manual will be framed in seven chapters:

- Chapter 1: Engineer View of the Operational Environment – describes the role of engineers and engineer support at higher echelons.
- Chapter 2: Modular Force Organization – describes the engineer organizations and the higher echelon headquarters they will support.
- Chapter 3: Foundations of Engineer Operations – discusses integration of engineer operations at higher echelons.
- Chapter 4: Theater Army Echelon Engineer Operations – describes engineer support for theater army echelon operations.
- Chapter 5: Corps Echelon Engineer Operations – describes engineer support for corps echelon operations.
- Chapter 6: Division Echelon Engineer Operations – describes engineer support for division echelon operations.
- Chapter 7: Sustainment Support for the Engineer Unit – discusses considerations for sustainment of engineer units and operations at echelons above the BCT.

In addition to these chapters, a number of appendixes will be included in the manual to provide additional detailed discussion for a variety of selected topics.

Current Development Status

The writing team is currently preparing a final draft of FM 3-34.22 and the initial draft of FM 3-34.23. Both drafts were completed in time for a presentation and discussion prior to ENFORCE 2008. Based on the guidance from the review of these documents and this virtual meeting/Council of Colonels, revised and updated drafts will be completed later in the year and staffed for Armywide review and comment. After the comments from these staffings are received and adjudicated, final electronic file drafts will be prepared, edited, and staffed to enable these manuals to be published (in print and on AKO). Other focused working group actions and staffing dates will be developed as necessary to support the production of the manuals for the Regiment. The publication of these manuals and placement on AKO is projected for late 2008 for FM 3-34.22 and late 2009 for FM 3-34.23. Your participation in the reviews and development of these manuals is necessary to make them relevant and useful to all leaders in the Engineer Regiment and the Army.

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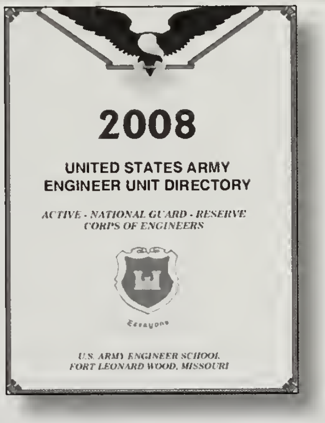
Lieutenant Colonel Lefler is the Chief of the Engineer Doctrine Branch, United States Army Maneuver Support Center Directorate of Training, Fort Leonard Wood, Missouri. He is a registered professional engineer in Nebraska and a Project Management Professional.



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Essayons

U.S. ARMY ENGINEER SCHOOL
FORT LEONARD WOOD, MISSOURI

2008 Engineer Unit Directory

The 2008 United States Army Engineer Unit Directory is available online in Adobe PDF format at <*http://www.wood.army.mil/engrmag/Engr%20Unit%20Dir/2007Directoryonline.pdf*>. Take a moment and see if your unit's listing is correct. Changes to the Unit Directory can be made by calling (573) 563-7644 or e-mailing <*leon.engineer@conus.army.mil*>.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	10 Mar 03	As the engineer keystone manual, this field manual (FM) encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations and at all echelons. While embracing the concept of modularity, this manual is being updated to fully integrate the modular engineer force (MEF). The new versions of Joint Publication (JP) 3-34, *Joint Engineer Operations*; JP 3-0, *Joint Operations*; FM 3-0, *Full Spectrum Operations*; and other manuals drove the requirement for this manual to be updated. All other Army engineer doctrinal manuals are based on the principles and tenets found in this manual. **Revision Highlights:** MEF, warfighting functions, explosive ordnance clearance agent (EOCA), and the maneuver enhancement brigade (MEB). **Status**: Under revision in FY 08. The revision is linked to the FM 3-0 revision and its finalization; the final draft staffing is complete, the comments have been received, and adjudication of the comments is ongoing.
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations – Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of all three types of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units. It combines the current manuals that guide engineer operations in BCTs, and will integrate the significant changes caused by transformation. Changes in the structure of the force have caused adjustments to the command and control (C2) structure and tailoring of engineer forces to support the BCTs. Engineer augmentation of each of the BCTs now occurs on a regular basis. Recent lessons learned in security and reconstruction operations; infrastructure reconnaissance; clearing operations; and engineer support to intelligence, surveillance, and reconnaissance (ISR) operations will also be incorporated. This manual will support the BCT doctrine found in FM 3-90.6 and include key engineer employment principles and C2 procedures found in FM 3-90.61. **Revision Highlights:** MEF and warfighting functions. **Status:** Preparing the final draft.
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the structure of the force have not changed the principles of breaching, but they have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. Recent lessons learned in clearance operations are being incorporated into this revision, as well as selected information on improvised explosive device (IED) defeat and gap crossing operations. The numbering for this manual reflects its critical relationship to the keystone manual FM 3-90, *Tactics and Combined Arms Operations*.

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U.S. Army Maneuver Support Center Training and Doctrine Development Department Doctrine Division, Engineer Branch			
Publication Number	**Title**	**Date**	**Description (and Current Status)**
			Combat Engineering (continued)
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations,* cont.	Aug 00	**Revision Highlights:** MEF, five areas of mobility (breaching, clearing, gap crossing, combat roads and trails, forward aviation combat engineering [FACE]), IEDs, urban breaching, and warfighting functions. **Status:** In final draft (on hold to address transition to warfighting functions and awaiting release of the revisions of FM 3-0 and FM 3-90). It likely will require some rework and possibly restaffing.
FM 3-90.12 (FM 90-13)	*Combined Arms Gap Crossing Operations*	Jan 98	This is a full revision, to include renaming and renumbering of FM 90-13/MCRP 3-17.1, *River Crossing Operations*. This manual is and will continue to be a dual-designated manual with the Marine Corps. While changes in the structure of the force have not changed the basic principles of river crossing operations, they have required that the TTP associated with river crossing be adjusted. The revised manual incorporates considerations for all gap crossing operations. FM 3-90.11 will be the base manual for discussions on mobility operations, and FM 3-90.12 will be written as a companion manual, taking advantage of the discussion of mobility operations in FM 3-90.11. The numbering for this manual reflects its critical relationship to the keystone manual FM 3-90. **Revision Highlights:** MEF, engineer reconnaissance, gap crossing definitions, and warfighting functions. **Status:** The U.S. Army Engineer School Commandant has approved the manual; awaiting Marine Corps approval. The estimated posting to Army Knowledge Online (AKO) is Spring 2008.
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sep 94; Mar 85	FM 90-7 was a solid combined arms manual, but was in need of a significant revision. The integration of FM 5-102, *Countermobility*, into this manual is a logical progression since most of the information is either complementary or redundant. Both manuals needed updating and expansion of their material to incorporate aspects of the contemporary operating environment (COE). It will be renumbered as FM 3-90.13 during revision, reflecting the combined arms nature of these operations. This manual will contain the enduring basic fundamentals associated with countermobility operations. **Revision Highlights:** MEF, warfighting functions, and intelligent munitions. **Status:** Preparing program directive and initial draft.
FM 3-34.170 (FM 5-170)	*Engineer Reconnaissance*	May 98	This manual provides doctrinal guidance for engineer reconnaissance across the full spectrum of operations. It encompasses engineer reconnaissance in support of tactical operations, as well as engineer technical reconnaissance support, and introduces infrastructure reconnaissance. This manual supersedes FM 5-170. Changes in the structure of the force have not changed the basic principles of engineer employment, but they will adjust the C2 structure and tailoring of engineer forces to support the BCT. Recent lessons learned include the need to define, develop, and provide a proponent manual for infrastructure reconnaissance and its memory aid sewage, water,

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
			Combat Engineering (continued)
FM 3-34.170 (FM 5-170)	*Engineer Reconnaissance*, cont.	May 98	electricity, academics, trash, medical, safety, and other considerations (SWEAT-MSO). **Revision Highlights:** The introduction of infrastructure reconnaissance (assessment and survey), environmental reconnaissance (assessment and survey), engineer reconnaissance teams, field force engineering (FFE), and other reachback mechanisms. The manual highlights the creation of the first dedicated engineer reconnaissance element in the engineer company of the heavy brigade combat team (HBCT). **Status:** U.S. Army Engineer School Commandant and the Marine Corps approved; accepted and approved by the Combined Arms Doctrine Directorate (CADD); and forwarded to the Army Publishing Directorate (APD) for publishing and posting to AKO.
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This is a full revision, to include renumbering, of FM 5-103, *Survivability Operations*, which was last published in 1985. The emergence of protection doctrine, coupled with changes to FM 3-0 and FM 3-34, mandated a full revision. It will also relate survivability to the other capability elements of the protection warfighting function, as described and defined in FM 3-0 and FM 3-10. This manual focuses on providing survivability information needed by commanders and their staff at the tactical level, but has applicability for a much larger audience as well. The manual relates the engineer-focused aspects of survivability to the broader use of the terms of survivability and protection. This manual addresses the aspects associated with the six areas of survivability, with a focus on hardening. The manual will expand the discussion of survivability across all echelons. **Revision Highlights:** Protection, hardening, antiterrorism considerations, and warfighting functions. **Status:** Preparing final draft for update. It is on hold for release of FM 3-10.
FM 3-34.281 (FM 20-21)	*Military Diving*	Jan 99	The original manual (FM 20-21) was a complete adoption of the Navy diving manual and a complete reproduction of Change 4 to Navy diving manual SS521-AG-PRO-010, dated Jan 99. This manual, which will be renumbered as FM 3-34.281 during revision, will support one of the modular units of the MEF. Within the Army, this document is used by special operations forces, as well as engineer divers. **Revision Highlights:** To make the manual more useful and comprehensive for Army use, the entire Navy diving manual will not be adopted; instead, the targeted sections applying to Army diving use will be adopted with other Army-specific considerations being added to the manual, creating an Army-focused diving manual. **Status:** A sequential effort will begin in detail after the Navy update to the Navy diving operational manual; developing the program directive.

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Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering			
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This is the primary manual relating the engineer function that bears its name. It provides the linkage between the engineering doctrine contained in FM 3-0, FM 3-34, and JP 3-34. As the implementing manual for general engineering, this manual describes the operational environment (OE) and how to apply and integrate general engineering principals in support of full spectrum operations. This manual is designed primarily to assist Army engineers at all echelons in planning and coordinating general engineering operations at the strategic, operational, and tactical levels. It is the primary doctrinal manual to define the engineer function of general engineering. It links to the FM 3-10 definitions of *base camp* and the various types of base camps. General engineering tasks are a part of most military operations. The degree of Army engineer involvement in accomplishing these tasks will vary based on the mission, situation, availability of engineer resources and the commander's intent. Planners must recognize that joint and Army transformation has rapidly changed the way we resource and conduct operations, and the application of general engineering is no exception. We have always tailored engineer elements and capabilities to support the force. The provisions of the MEF have provided additional modularity into Army engineer organizations to facilitate the commitment of only the required engineer assets into the theater of operations (TO). Enhancing the capabilities of those assets are reachback capabilities that minimize the footprint of engineers while optimizing the performance of those deployed elements. Planners must apply these improvements and ensure that the general engineering effort is seamlessly woven into the commander's plan in a proactive fashion and accomplishes the commander's intent. This manual is the primary reference for all the other general engineering-related engineer reference manuals. **Revision Highlights:** Infrastructure reconnaissance, field force engineering (FFE) (reachback), homeland support, MEF, and warfighting functions. **Status:** Editing of the final electronic file, quality control, staffing for U.S. Army Engineer School Commandant approval, with an estimated posting to AKO as Spring 2008.
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields and Helipads*	Aug 94; Sep 94	This is a full revision and consolidation of FM 5-430-00-1 and FM 5-430-00-2 into one manual that is separated into two volumes. This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force designation of AFJPAM 32-8013, Volumes I and II. The Navy plans to participate in this revision and to adopt this manual as well, making it multi-Service. The intent is to update the current FMs with new techniques and procedures for planning and designing roads, airfields, and heliports in support of TO. The revision will integrate recent doctrinal updates. FM 3-34.410 is intended for use as a reference text and training guide for engineer personnel responsible for planning, designing, and constructing roads, airfields, and heliports in the TO. The two current FMs are essentially one manual divided into two separate volumes. Volume 1 is a stand-alone volume for the design of TO roads. This volume also serves as a detailed description of information common to both roads and airfields. Volume II serves as the basis for airfield and heliport design. It covers the complete process

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
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Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields and Helipads,* cont.	Aug 94; Sep 94	of airfield and heliport construction. It is not a stand-alone volume. Volume 1 contains much of the information required to design the substructure of an airfield or a heliport. **Revision Highlights:** This is a collaborative effort with the Engineer Research and Development Center (ERDC) and the U.S. Army Corps of Engineers (USACE) Transportation Center of Excellence (Omaha), Air Force, Air Force Civil Engineering Support Agency (AFCESA), and the Navy. It includes the newest technologies, current practices, and revision of formulas. **Status:** Initiating the program directive and developing the initial draft.
FM 3-34.428 (FM 5-424)	*Theater of Operations Electrical Systems*	Jun 97	This manual is intended to be used as a reference text and training guide for engineer personnel who are responsible for planning and executing (TO) construction. The five major parts of this manual provide practical information for military personnel in the design, layout, installation, and maintenance of exterior and interior electrical wiring, and power-generation and distribution systems. The manual will be renumbered as FM 3-34.428 during this revision. While not currently designed to support a specific module of the MEF, this manual does support the general engineering function and typical vertical construction efforts. **Revision Highlights:** This manual needs to be revised to make it more comprehensive and includes more details on tactical power generation below prime power, power distribution, the newest technologies, and current practices in the deployed environments. **Status:** Developing the program directive.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual is intended to provide technical information necessary for military personnel to obtain samples and perform engineering tests and calculations on soils, bituminous paving mixtures, and concrete. These tests and calculations are required to achieve proper design with these materials and adequate control over their use in military construction. The manual covers soils, aggregates, bituminous cements, bituminous paving mixtures, portland-cement concrete, and stabilized soil—including stabilizing agents such as bitumens, cements, lime, fly ash, and chemical modifiers.The current manual (FM 5-472) gives detailed instructions for taking adequate representative test samples tests and for recording, calculating, and evaluating test results. The test procedures and terminology used in this manual conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. This manual is currently a multi-Service publication with the Navy and the Air Force (NAVFAC MO 330/AFJMAN 32-1221(I). The manual will be renumbered as FM 3-34.451 during its revision. **Revision Highlights:** It a collaborative effort with ERDC and USACE Transportation Center of Excellence (Omaha), the Air Force, AFCESA, and the Navy. Newest technologies, current practices, and revision of formulas. **Status:** Initiating the program directive and developing the initial draft.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual emphasizes the aspects of pit and quarry layout, design, and operation. It outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on the equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. The revised manual will contain the revision and consolidation of the material in this manual, and the material contained in FM 3-34.468, *Seabee Quarry Blasting Operations and Safety Manual.* **Revision Highlights:** It is a collaborative effort with the Navy, with an Army lead and possible Air Force participation as well. The intent is to combine the two existing manuals into one manual containing the newest technologies, current practices, and revision of formulas, with an overall update of the materials contained within. **Status:** Staffing the program directive and initiating development of the initial draft.
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for engineer personnel responsible for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This manual, currently a multi-Service publication with both the Navy and the Air Force (NAVFAP P-1065/AFMAN 32-1072), will support one of the modules of the MEF. **Revision Highlights:** This is a collaborative effort with the Navy, with Navy lead and Air Force participation. The intent is to update the material with the newest technologies, current practices, and revised formulas, making the main body of the document multi-Service in nature with specific appendixes to address Service differences in capabilities and equipment. **Status:** The initial draft is out for staffing and comment.
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	The purpose of FM 5-415 is to give a commander and members of firefighting teams direction on deploying and using engineer firefighting teams. Engineer firefighting teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a TO. Normally, there are not enough firefighting assets within the TO; therefore, commanders must prioritize assets and facilities that are mission-essential and deploy firefighting assets accordingly. The manual will support one of the modular units of the MEF. It will be renumbered as FM 3-34.485 during revision. **Revision Highlights:** This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status:** Initiating the program directive and developing the initial draft subsequent to the revision of the AR and the conduct of the convoy firefighting integrated capabilities development team (ICDT).

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
			General Engineering (continued)
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	FM 3-100.4, *Environmental Considerations in Military Operations*, guides the Army and the Marine Corps in applying appropriate environmental protection procedures during all types of operations. It also provides basic techniques and procedures for units at the company, battalion, and brigade/regiment levels. This manual states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes the growing strategic significance of environmental factors in the 21st century. As a unit procedures manual, it describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. This manual is currently a dual-designated manual with the Marine Corps and is under revision by the Directorate of Environmental Integration. When this revision is complete, the manual will have an Army number of FM 3-34.500. **Revision Highlights:** The revision will contain information and lessons learned from current operations. It will continue to be a dual-designated manual with Marine Corps involvement. **Status:** Staffing for U.S. Army Engineer School Commandant and Marine Corps approval and posting to AKO.

NOTE: All current engineer publications can be accessed and downloaded in electronic format from the MSKN Engineer Doctrine website at <*https://www.us.army.mil/suite/page/500629*> or the Reimer Digital Library at <*http://www.adtdl.army.mil/*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the Engineer Doctrine Branch at <*leon.mdottd-dengdoc@conus.army.mil*>. The development status of these manuals was current as of 1 February 2008.

Engineer Doctrine Contact Update

The Engineer Doctrine team would like to introduce to the Regiment its newest member, Mr. Jeff Beacham, who is taking over from Mr. Les Hell as the Engineer Senior Doctrine Analyst as Les moves up to assume the duties of the Deputy Doctrine Chief for the Maneuver Support Center (MANSCEN). Good luck and best wishes are extended to Les as he makes his transition to MANSCEN, and a warm welcome is extended to Jeff as he comes onboard. Jeff's Army Knowledge Online (AKO) contact information is <*jeffery.beacham@us.army.mil*>. If you haven't already, you will soon begin to see the staffing of draft doctrine coming to you from Jeff.

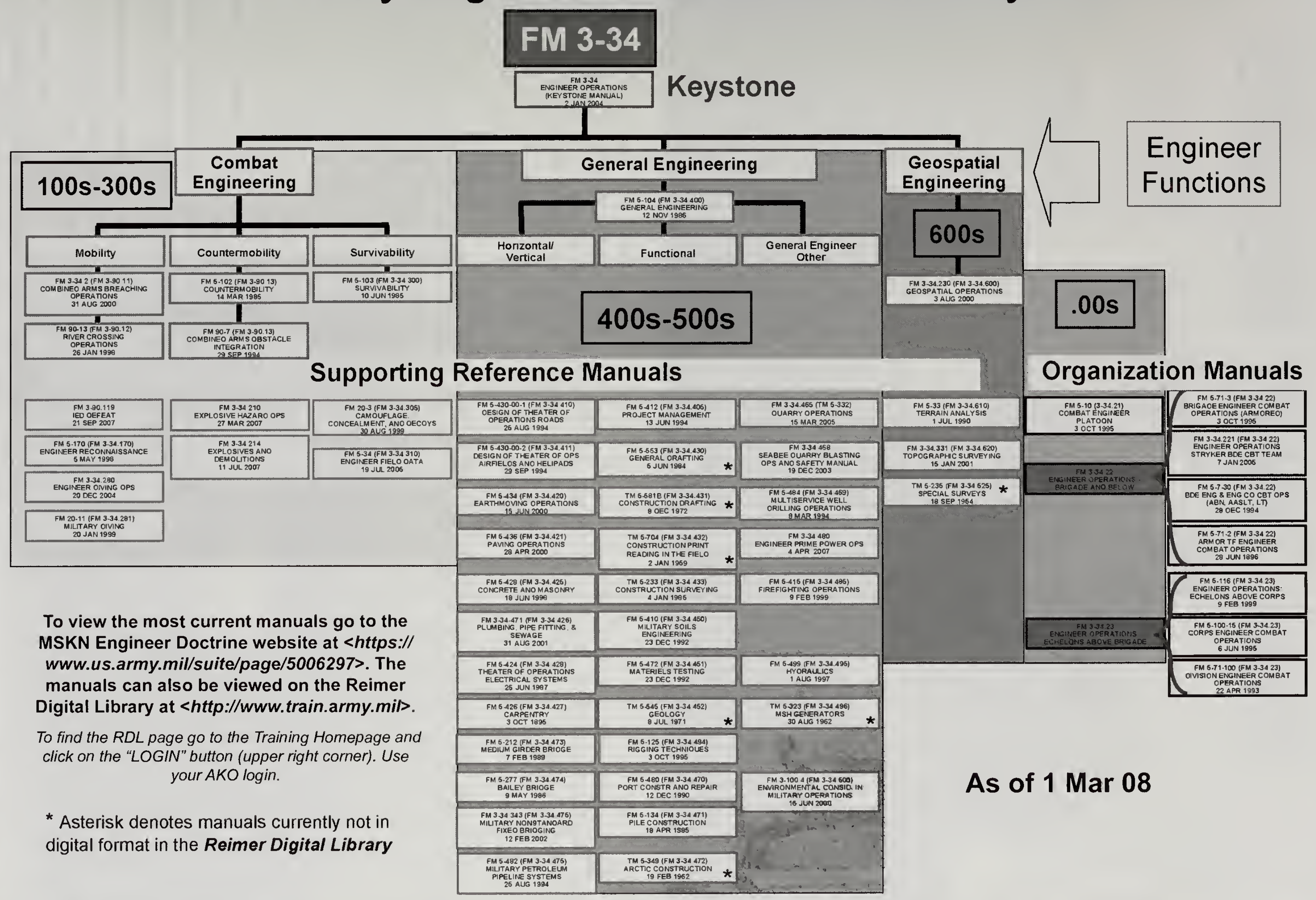
A new Maneuver Support Knowledge Network (MSKN) website has been established for Engineer Doctrine. There you can download the current manuals in the Engineer Doctrinal Hierarchy, as well as drafts of the various manuals under revision, and can stay updated on the status of those revisions and view the final comment matrices on each draft. The page may be reached through the MSKN homepage or via this link, which goes directly to the Engineer page vice the MSKN homepage after AKO login: <*https://www.us.army.mil/suite/page/500629*>.

The Engineer Doctrine element is the lead for the Regiment's doctrine. The Engineer School's Doctrine Division is consolidated at the MANSCEN level within the MANSCEN Directorate of Training (MDoT) Doctrine Division. The telephone numbers for Engineer Doctrine are—Doctrine Chief, (573) 563-8161; Senior Doctrine Analyst, (573) 563-0003 (DSN prefix, 676-).

The mailing address for written correspondence is: Commandant, United States Army Engineer School, ATTN: ATZT-TDD-E, 320 MANSCEN Loop, Suite 220, Fort Leonard Wood, Missouri 65473-8929.

For electronic correspondence, the generic NIPR e-mail address has changed to <*leon.mdottddengdoc@conus.army.mil*>.

Army Engineer Publications Hierarchy



FM 3-34

FM 3-34
ENGINEER OPERATIONS
(KEYSTONE MANUAL)
2 JAN 2004

Keystone

Engineer Functions

Combat Engineering

100s-300s

Mobility

FM 3-34.2 (FM 3-90.11)
COMBINED ARMS BREACHING OPERATIONS
31 AUG 2000

FM 90-13 (FM 3-90.12)
RIVER CROSSING OPERATIONS
26 JAN 1998

Countermobility

FM 5-102 (FM 3-90.13)
COUNTERMOBILITY
14 MAR 1985

FM 90-7 (FM 3-90.13)
COMBINED ARMS OBSTACLE INTEGRATION
29 SEP 1994

Survivability

FM 5-103 (FM 3-34.300)
SURVIVABILITY
10 JUN 1985

General Engineering

FM 5-104 (FM 3-34.400)
GENERAL ENGINEERING
12 NOV 1986

Horizontal/Vertical

Functional

General Engineer Other

400s-500s

Geospatial Engineering

600s

FM 3-34.230 (FM 3-34.600)
GEOSPATIAL OPERATIONS
3 AUG 2000

.00s

Supporting Reference Manuals

FM 3-90.119
IED DEFEAT
21 SEP 2007

FM 5-170 (FM 3-34.170)
ENGINEER RECONNAISSANCE
5 MAY 1998

FM 3-34.280
ENGINEER DIVING OPS
20 DEC 2004

FM 20-11 (FM 3-34.281)
MILITARY DIVING
20 JAN 1999

FM 3-34.210
EXPLOSIVE HAZARD OPS
27 MAR 2007

FM 3-34.214
EXPLOSIVES AND DEMOLITIONS
11 JUL 2007

FM 20-3 (FM 3-34.305)
CAMOUFLAGE, CONCEALMENT, AND DECOYS
30 AUG 1999

FM 5-34 (FM 3-34.310)
ENGINEER FIELD DATA
19 JUL 2006

FM 5-430-00-1 (FM 3-34.410)
DESIGN OF THEATER OF OPERATIONS ROADS
26 AUG 1994

FM 5-430-00-2 (FM 3-34.411)
DESIGN OF THEATER OF OPS AIRFIELDS AND HELIPADS
29 SEP 1994

FM 5-434 (FM 3-34.420)
EARTHMOVING OPERATIONS
15 JUN 2000

FM 5-436 (FM 3-34.421)
PAVING OPERATIONS
28 APR 2000

FM 5-428 (FM 3-34.425)
CONCRETE AND MASONRY
18 JUN 1998

FM 3-34-471 (FM 3-34.426)
PLUMBING, PIPE FITTING, & SEWAGE
31 AUG 2001

FM 5-424 (FM 3-34.428)
THEATER OF OPERATIONS ELECTRICAL SYSTEMS
25 JUN 1997

FM 5-426 (FM 3-34.427)
CARPENTRY
3 OCT 1896

FM 5-212 (FM 3-34.473)
MEDIUM GIRDER BRIDGE
7 FEB 1989

FM 5-277 (FM 3-34.474)
BAILEY BRIDGE
9 MAY 1986

FM 3-34.343 (FM 3-34.476)
MILITARY NONSTANDARD FIXED BRIDGING
12 FEB 2002

FM 5-482 (FM 3-34.475)
MILITARY PETROLEUM PIPELINE SYSTEMS
25 AUG 1994

FM 5-412 (FM 3-34.406)
PROJECT MANAGEMENT
13 JUN 1994

FM 5-553 (FM 3-34.430)
GENERAL DRAFTING
5 JUN 1984 *

TM 5-581B (FM 3-34.431)
CONSTRUCTION DRAFTING
9 DEC 1972 *

TM 5-704 (FM 3-34.432)
CONSTRUCTION PRINT READING IN THE FIELD
2 JAN 1969 *

TM 5-233 (FM 3-34.433)
CONSTRUCTION SURVEYING
4 JAN 1985

FM 5-410 (FM 3-34.450)
MILITARY SOILS ENGINEERING
23 DEC 1992

FM 5-472 (FM 3-34.451)
MATERIELS TESTING
23 DEC 1992

TM 5-545 (FM 3-34.452)
GEOLOGY
8 JUL 1971 *

FM 5-125 (FM 3-34.494)
RIGGING TECHNIQUES
3 OCT 1995

FM 5-480 (FM 3-34.470)
PORT CONSTR AND REPAIR
12 DEC 1990

FM 5-134 (FM 3-34.471)
PILE CONSTRUCTION
18 APR 1985

TM 5-349 (FM 3-34.472)
ARCTIC CONSTRUCTION
19 FEB 1962 *

FM 3-34.465 (TM 5-332)
QUARRY OPERATIONS
15 MAR 2005

FM 3-34.468
SEABEE QUARRY BLASTING OPS AND SAFETY MANUAL
19 DEC 2003

FM 5-484 (FM 3-34.469)
MULTISERVICE WELL DRILLING OPERATIONS
8 MAR 1994

FM 3-34.480
ENGINEER PRIME POWER OPS
4 APR 2007

FM 5-415 (FM 3-34.486)
FIREFIGHTING OPERATIONS
9 FEB 1999

FM 5-499 (FM 3-34.495)
HYDRAULICS
1 AUG 1997

TM 5-323 (FM 3-34.496)
MSH GENERATORS
30 AUG 1962 *

FM 3-100.4 (FM 3-34.500)
ENVIRONMENTAL CONSID. IN MILITARY OPERATIONS
15 JUN 2000

FM 5-33 (FM 3-34.610)
TERRAIN ANALYSIS
1 JUL 1990

FM 3-34.331 (FM 3-34.620)
TOPOGRAPHIC SURVEYING
15 JAN 2001

TM 5-235 (FM 3-34.625)
SPECIAL SURVEYS
18 SEP 1964 *

Organization Manuals

FM 5-10 (3-34.21)
COMBAT ENGINEER PLATOON
3 OCT 1995

FM 3-34.22
ENGINEER OPERATIONS - BRIGADE AND BELOW

FM 5-71-3 (FM 3-34.22)
BRIGADE ENGINEER COMBAT OPERATIONS (ARMORED)
3 OCT 1995

FM 3-34.221 (FM 3-34.22)
ENGINEER OPERATIONS STRYKER BDE CBT TEAM
7 JAN 2005

FM 5-7-30 (FM 3-34.22)
BDE ENG & ENG CO CBT OPS (ABN, AASLT, LT)
28 DEC 1994

FM 5-71-2 (FM 3-34.22)
ARMOR TF ENGINEER COMBAT OPERATIONS
28 JUN 1896

FM 3-34.23
ENGINEER OPERATIONS ECHELONS ABOVE BRIGADE

FM 5-116 (FM 3-34.23)
ENGINEER OPERATIONS: ECHELONS ABOVE CORPS
9 FEB 1999

FM 5-100-15 (FM 3-34.23)
CORPS ENGINEER COMBAT OPERATIONS
6 JUN 1995

FM 5-71-100 (FM 3-34.23)
DIVISION ENGINEER COMBAT OPERATIONS
22 APR 1993

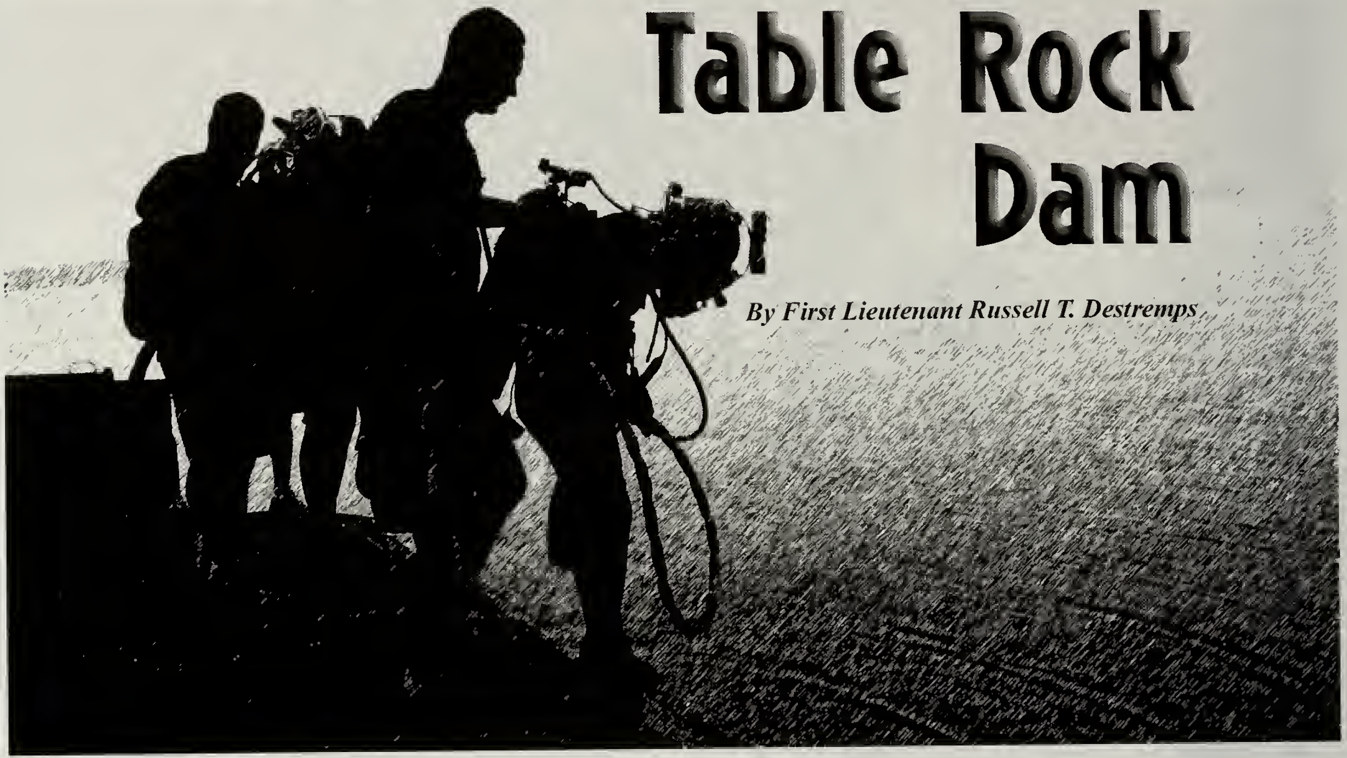
As of 1 Mar 08

To view the most current manuals go to the MSKN Engineer Doctrine website at <*https://www.us.army.mil/suite/page/5006297*>. The manuals can also be viewed on the Reimer Digital Library at <*http://www.train.army.mil*>.

To find the RDL page go to the Training Homepage and click on the "LOGIN" button (upper right corner). Use your AKO login.

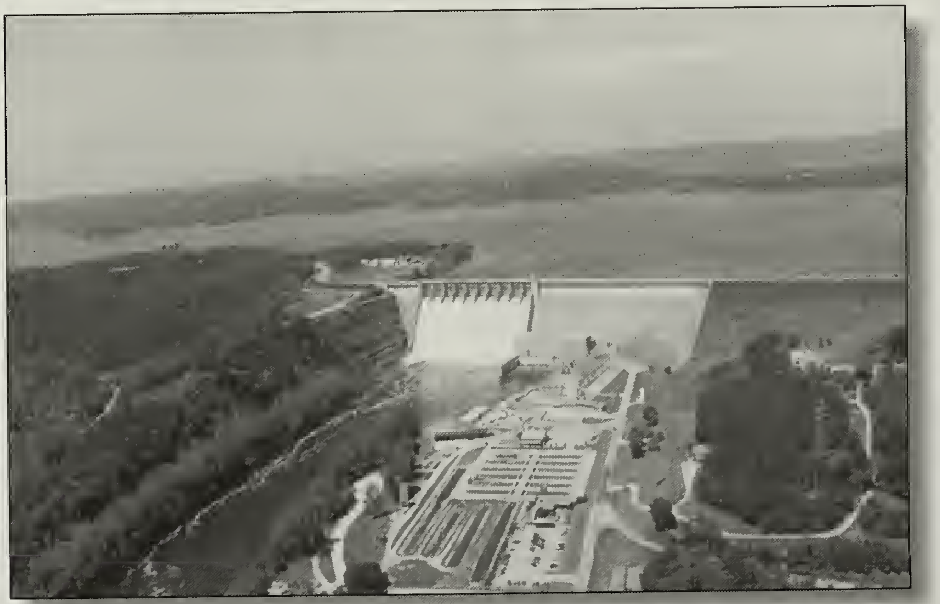
* Asterisk denotes manuals currently not in digital format in the ***Reimer Digital Library***

Dive Team Repairs Table Rock Dam



By First Lieutenant Russell T. Destremps

Over the past five years, engineers operating the Table Rock Dam at Branson, Missouri, have seen an alarming amount of water from Table Rock Lake leaking through the face of the dam into an inspection gallery buried by nearly 180 feet of concrete. Because of this leak, an additional pump was installed to remove the water, which was rushing in at a rate of more than 400 gallons per minute. When the United States Army Corps of Engineers (USACE) Little Rock District decided it was time to do something about this leak before it got any worse, it enlisted the services of the United States Army Dive Company from Fort Eustis, Virginia.



The lake created by Table Rock Dam has a surface of more than 43,000 acres.

Earlier this year, four members of the 86th Engineer Team (Dive), an individually deployable and self-sustainable detachment from the United States Army Dive Company, traveled to Branson with a remotely operated vehicle (ROV) to inspect the dam and locate the source of the leak. The ROV allowed the team to travel with minimal equipment and still safely inspect and survey the dam. The ROV is equipped with a camera that sends streaming video to the surface and is easily maneuverable in the water. After a successful reconnaissance, the team planned a full-scale repair operation for 16 to 22 September 2007.

On 16 September, the 86th linked up with the 50th Multirole Bridge

Soldiers load gear onto the float bridge before moving it to the face of the dam.

Company (MRBC) from Fort Leonard Wood, Missouri, which deployed to support the diving mission with a six-bay float bridge section to be used for a working and diving platform. With more than ten common bridge trucks (CBTs) and support vehicles in convoy, the 50th MRBC traveled more than 100 miles and deployed its bridge sections directly from the CBTs. The sections, which expanded as they hit the water, were promptly retrieved by one of the unit's bridge erection boats and towed to be assembled with the other bridge sections. The entire operation took less than 90 minutes and resulted in a 25- by 120-foot floating platform that could easily support the weight of the divers' equipment. The rapidly deployable float bridges are designed to support the weight of a 70-ton M1 Abrams main battle tank. The working space and maneuverability offered by the bridge sections were helpful to the mission.

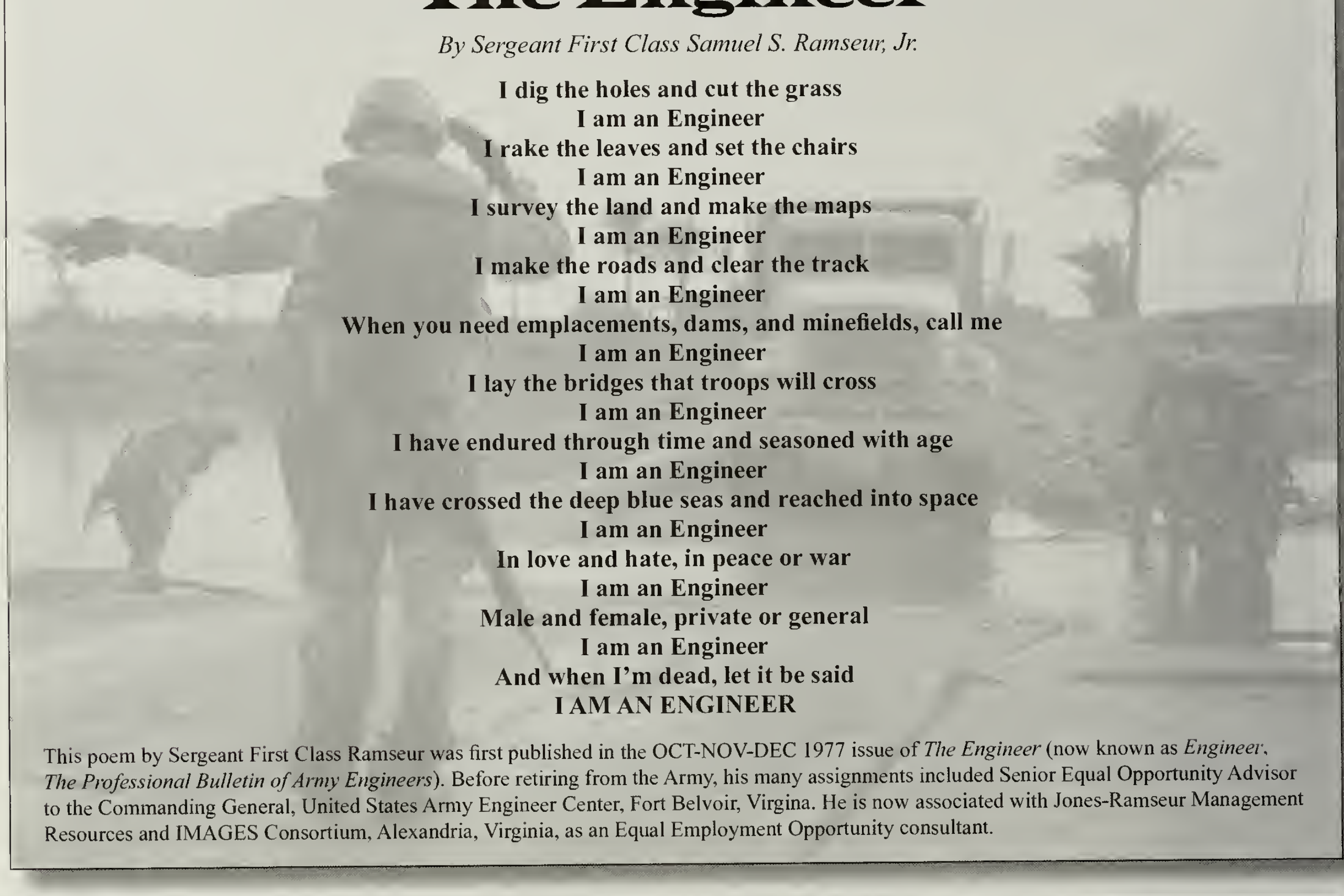
The Soldiers of the 50th MRBC secured the floating platform to the side of the dam; the 86th divers set up their equipment and began repair operations on 17 September. After the ROV located a series of 2- to 6-inch holes in the face of the dam, divers went down more than 140 feet to repair them. Despite the relatively small size of the holes, the amount of suction they create at such depths calls for a great deal of respect and caution from the divers. Their hands, feet, or equipment could get stuck in the holes, slowing production or even causing serious injury or equipment malfunction.

The 86th divers worked continually for three days alongside the Soldiers of the 50th MRBC and the USACE engineers and operators to fix the dam. The divers used underwater hydraulic drilling equipment to install a 200-pound patch fabricated by USACE engineers, bolting it onto the face of the dam to cover the holes. The patch was equipped with fittings to pump in a two-part grout that would expand as it came into contact with the water and fill the voids in the concrete where the water was leaking through. After the diving evolutions were completed, dam operators reported that the flow of water into the inspection gallery of the dam had completely stopped.

The mission was a success that benefited all the parties involved. The mission was cost-efficient for USACE, and the Soldiers of the Army Dive Company and the 50th MRBC gained invaluable training experience. The Army Dive Company has an ongoing relationship with USACE districts across the country and has worked with the Little Rock District in the past. Dive missions such as the repairs performed on Table Rock Dam allow the company to execute real-world training stateside to prepare it for its wartime mission, while providing a professional service to USACE. The Army Dive Company continues to foster its relationship with USACE and looks forward to future training experiences with it.

First Lieutenant Destremps is a platoon leader with the 86th Engineer Team (Dive). Commissioned through the Army Reserve Officer Training Corps, he is a graduate of the Engineer Officer Basic Course and the Sapper Leader Course at Fort Leonard Wood, Missouri, and the Marine Engineer Dive Officer School at Panama City, Florida. He holds a bachelor's in mechanical engineering from Villanova University.

From the Archives



The Engineer

By Sergeant First Class Samuel S. Ramseur, Jr.

I dig the holes and cut the grass
I am an Engineer
I rake the leaves and set the chairs
I am an Engineer
I survey the land and make the maps
I am an Engineer
I make the roads and clear the track
I am an Engineer
When you need emplacements, dams, and minefields, call me
I am an Engineer
I lay the bridges that troops will cross
I am an Engineer
I have endured through time and seasoned with age
I am an Engineer
I have crossed the deep blue seas and reached into space
I am an Engineer
In love and hate, in peace or war
I am an Engineer
Male and female, private or general
I am an Engineer
And when I'm dead, let it be said
I AM AN ENGINEER

This poem by Sergeant First Class Ramseur was first published in the OCT-NOV-DEC 1977 issue of *The Engineer* (now known as *Engineer, The Professional Bulletin of Army Engineers*). Before retiring from the Army, his many assignments included Senior Equal Opportunity Advisor to the Commanding General, United States Army Engineer Center, Fort Belvoir, Virgina. He is now associated with Jones-Ramseur Management Resources and IMAGES Consortium, Alexandria, Virginia, as an Equal Employment Opportunity consultant.

Military Review
2008 Writing Competition

For the 2008 General William E. DePuy Special Topics Writing Competition, *Military Review* seeks original papers on "Actions Required to Attain Overall Objectives in the Aftermath of Combat Operations." Submissions should be from 3,500 to 7,000 words and should be unclassified, carefully researched papers on any topic examining issues related to post-combat operations. Previously published papers, or papers pending consideration for publication elsewhere, are ineligible.

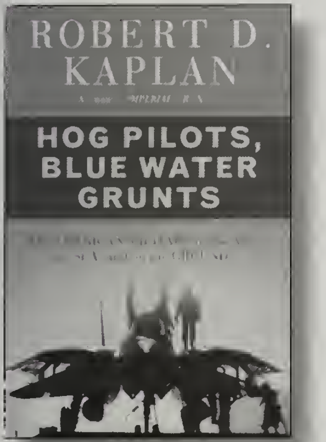
Winners, who will be announced in July 2008, will receive the following:

- 1st place: $1,000, featured publication in a future edition of *Military Review,* and a certificate.
- 2d place: $750, publication in *Military Review*, and a certificate.
- 3d place: $500, publication in *Military Review,* and a certificate.
- 4th place: $250, special consideration for publication in *Military Review*, and a certificate.
- Honorable mentions: $100, consideration for publication in *Military Review,* and a certificate.

Papers should be submitted with an enrollment form via e-mail, or in hard copy with a CD, not later than 2 June 2008. Send e-mail submissions to <*milrevweb@conus.army.mil*>. Mail hard copies with CDs to *Military Review,* 294 Grant Avenue, Fort Leavenworth, Kansas 66027-1254. For more details—to include a copy of the enrollment form, criteria for judging, and a list of potential topics—visit *Military Review* online at <*http://usacac.army.mil/CAC/milreview/index.asp*>.

For other information concerning the competition, contact the managing editor of *Military Review* at (913) 684-9330 or DSN 552-9330 or via e-mail at <*leav-milrevweb@conus.army.mil*>.

Book Reviews



Hog Pilots, Blue Water Grunts, by Robert D. Kaplan, Random House: New York, 2007, 388 pages, ISBN-10:1-40 00-6133-4, $27.95 (hardcover).

• • • • •

Robert Kaplan is known for providing well-written commentary on events of the day. His unique travelogue writing style captures the reader, while serving as a vehicle for offering observations on larger issues. In *Hog Pilots, Blue Water Grunts*, he effectively uses this device to deliver a compelling look at the U.S. military in action that manages to also offer provocative thoughts on how the military instrument of power can most effectively be used in the future.

Kaplan's premise is simple—in warfare of the future, the smaller the military footprint and the earlier the military is engaged, the more effective that military activity will be. He argues that low-profile engagements and use of proxies are the best use of the military instrument of power. This premise is the underpinning of every vignette he develops in this book. He examines the importance of personal relationships, understanding cultures, and decentralized initiative in the execution of policy decisions. He also does a commendable job of describing the unique culture of the military organizations he travelled with and observed.

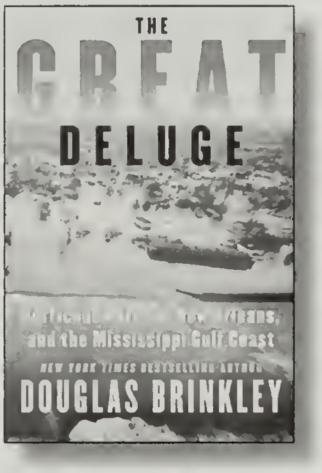
Kaplan takes readers on a whirlwind journey across the globe, introducing them to life on Navy destroyers and submarines, Marine platoons, Army Special Forces detachments, Air Force flying wings, and Defense Attaché Offices. He offers a smattering of history and geography to complement vignettes regarding the people who put boots on the ground. He clearly has a deep affinity with the Noncommissioned Officer Corps of all the Services.

The only criticism I can muster is that Kaplan is too invested in so-called elite formations. The only conventional Army unit he visits is the 172d Stryker Brigade, and he clearly considers it something apart from the rest of the conventional Army because of its unique capabilities. A thread of disdain for the larger institutional military runs through his work. Perhaps Kaplan is influenced by his close affinity with the unique units he travelled with. His specific and implied criticisms of the conventional Army ring hollow. He doesn't invest the time with conventional units and conventional headquarters that he does with the unique and elite.

I highly recommend *Hog Pilots, Blue Water Grunts.* Kaplan is an engaging storyteller, offers interesting perspectives on political and international events, and makes interesting arguments concerning the use of military power. His observations about the future of military operations are worthy of reflective thought.

Reviewed by Lieutenant Colonel Stephen V. Tennant, United States Army (Retired), Assistant Professor, Command and General Staff College, Fort Leavenworth, Kansas.

* * *


THE GREAT DELUGE
and the Mississippi Gulf Coast
NEW YORK TIMES BESTSELLING AUTHOR
DOUGLAS BRINKLEY

The Great Deluge: Hurricane Katrina, New Orleans, and the Mississippi Gulf Coast, by Douglas Brinkley, Harper Perennial: New York, 2006, 678 pages, ISBN: 978-0-06-114849-1, $17.95 (paper).

• • • • •

The environment in which the United States Army provides support to civil authorities during disaster response is very complex. The dynamic interaction of local and national politics, crisis management, and general disorder requires understanding and preparation in order to effectively deal with disaster response. *The Great Deluge: Hurricane Katrina, New Orleans, and the Mississippi Gulf Coast* by Douglas Brinkley of Tulane University is one of the first accounts of Hurricane Katrina and her aftermath and effectively captures the feel of a disaster response, while highlighting the friction points.

Brinkley provides a compelling account of the events of 27 August to 3 September 2005, during Hurricane Katrina. He has unique perspective (and perhaps motivation) as an eyewitness to Katrina. His writing style is slightly sarcastic, but also engaging. His work is meticulously researched from contemporary sources, weaving together vignettes from New Orleans citizens, government leaders, and news accounts into

(continued on page 46)

("Book Reviews," continued from page 45)

a gripping narrative. He takes a critical look at what happened in New Orleans and, to a lesser extent, the rest of the Gulf Coast and largely achieves his goal of writing a "...fast out of the gates history..." that enables "...holding city, state, and federal government officials responsible for their actions...."

He is unflinching in his description of events, dispensing both high praise and harsh criticism to key participants. He gives high marks to the United States Coast Guard, the Louisiana Department of Wildlife and Fisheries, the state of Texas, the city of Houston, and individual citizens too numerous to mention here. His harshest criticism is aimed at city officials and institutions in New Orleans, in particular Mayor Ray Nagin, Police Chief Eddie Compass, and the New Orleans Police Department. He is also very critical of Homeland Security Secretary Michael Chertoff, whom he says should be accountable for much of the slow start to the federal response and, in particular, the ineptitude of the Federal Emergency Management Agency.

Brinkley is strangely reticent in his criticism of Governor Kathleen Blanco, assigning responsibility to the city and the federal government that perhaps should accrue to the Blanco administration. He is also quite critical of President Bush, with some justification. At times, he goes too far; for example, stating (sourced from one opinion article, after the fact) that the slow federal response was due in part to partisan political considerations. With all the administration mismanagement and slow decision making available to critique, this vignette seems unnecessary and inflammatory.

The good and bad of the Department of Defense response are highlighted throughout Brinkley's work. His major criticism of the military isn't the response, but rather the perceived slow start and heavy-handedness in dealing with local officials. Brinkley harshly criticizes the United States Army Corps of Engineers (USACE) for the failure of the levee systems and the loss of buffering wetlands in Louisiana. In doing so, he doesn't adequately address the involvement (or lack thereof) of the congress, state government, and local authorities. Even so, his criticisms are valid and should be studied and considered in order to provide more effective military disaster response in the future.

I highly recommend this book to all engineer officers. Support to civil authority, in particular disaster response, is a full-spectrum operation that the United States Army has executed many times. USACE and engineer troop units are typically deeply involved in disaster responses. Understanding the environment and reflecting on mistakes made in crisis is critical. This book offers a perspective that professionals should study and understand in order to be effective.

Reviewed by Lieutenant Colonel Stephen V. Tennant, United States Army (Retired), Assistant Professor, Command and General Staff College, Fort Leavenworth, Kansas.

("Joint Engineer," continued from page 26)

vertical general engineering missions; meeting contingency and contracting requirements; and conducting reconstruction, humanitarian, and JIIM operations, regardless of Service. This program supports the leader competency effort by sharing knowledge of military construction skills and capabilities. Engineer training centers will collaborate to teach Service cultures and languages to all exchange members. This concept establishes Service engineer partnerships with civilian educational institutions to establish an engineer degree program and professional technical certifications for our engineers to develop a Department of Defense (DOD) system of expert engineers.

Military and Industry Strategic Alliance Program

This concept enhances the commonality and interoperability of DOD engineer joint equipping and procurement processes. The alliance program would establish ways to develop a common equipping process to provide like engineer equipment to all Services. Most notable is the partnership with industry to build a civilian equipment-training program. Within military organizations, the program identifies the strengths of each Service's engineers and includes ways to minimize challenges based on unique strengths, capabilities, and skills the other Services possess. Equipment standardization agreements allow forces to train on the same equipment within the training centers, matching the equipment systems currently used in theater operations.

Conclusion

Today's fight demands that engineers have expertise in planning war, peace, and reconstruction operations. The common thread is joint training and education. The type of mission support being performed also drives the process differences to perform engineering tasks. Engineers have to be educated and trained on combat engineering, contracts, procurement processes, project funding, project management, construction management planning tools, large-scale infrastructure planning, base camp planning, general engineering skills, and more. The personnel working these tasks are becoming more junior in grade, and yet joint billets require them to be smarter in operational planning and arrive in-theater with technically competent skill sets and joint engineer knowledge. This is the key to assisting combatant commands with engineer capabilities both inside and outside the wire. Leaders from the joint engineer community recognize the gaps and are taking great initiatives to provide the appropriate level of training and education to every echelon of the force.

Ms. Walkenbach is a contractor with C2 Technologies, Inc., and works in the Directorate of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri.

For more information, contact the author at <*rachel.m.walkenbach*>.

Operation Alaskan Road

By Ms. Vicki D. Hall

Just 15 miles south of Ketchikan, Alaska, in a remote region of the Inside Passage, lies a pristine island rain forest known as Annette Island. It was founded by Anglican missionary William Duncan and 800 Tsimshian Indians in 1887, and in 1891, by Congressional Act, it became the Annette Island Reservation. In 1916, all waters and inlets within 3,000 feet of the island's shoreline were included. Today, Annette Island and its surrounding islands comprise the only Indian reservation in Alaska. Metlakatla, with 1,800 residents, is the only inhabited village on the 136-square-mile island.

During World War II, a large airfield was built on the island as part of a defense network for the Canadian and American forces. After the war, the airfield became a United States Coast Guard search-and-rescue base, as well as a weather station for the United States Weather Bureau. For a brief period, the Federal Aviation Administration based personnel on-site. Until recently, it was the largest airfield in Alaska and continued to serve the area commercially until the 1970s. With the completion of the new Ketchikan Airport on Gravina Island, and the transfer of the Coast Guard Station to Sitka in 1977, Annette Field officially closed.

The Project

Operation Alaskan Road is the fulfillment of a 50-year-old promise made to the Metlakatla Indian Community after World War II—by the Alaska Road Commission and the United States Army Corps of Engineers—to build a road connecting their ocean side city to Alaska's Inside Passage. This would allow year-round ferry service to Ketchikan, Alaska's fourth largest city. The economy of Metlakatla is poor because of limited mobility to jobs and trade centers in Ketchikan, and the unemployment rate hovers near 80 percent.

Designated as an Innovative Readiness Training Program, Operation Alaskan Road was under the overall responsibility of the Alaskan Command, with the Missouri Army National Guard filling key leadership positions and providing engineering expertise. The road—14.3 miles of paved two-lane road with no more than a 7-degree grade in the roadbed—was a challenge seldom seen by military engineers. Clearing the dense vegetation (*muskeg*, which was sometimes 25 feet deep),[1] blasting and moving 1.5 million cubic yards of rock, and an average annual rainfall of 13 feet challenged the military engineers' expertise. Because of the inclement weather, work on the project was limited to spring through late summer, so the project took 10 years to complete—from 1998 to 2007.

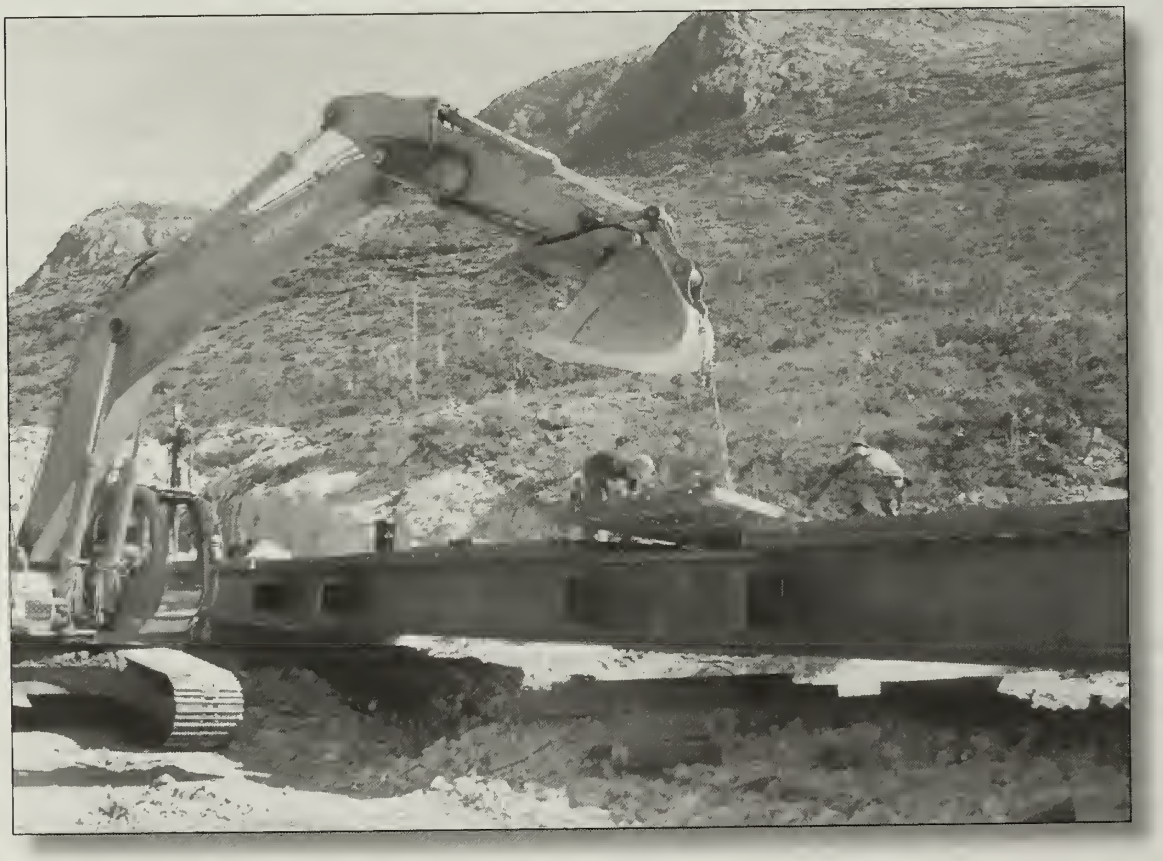
In preparation for the 1998 arrival of construction forces, Navy Seabees constructed Base Camp Wy Wuh in 1997. The joint task force consisted of Army National Guard, Navy Reserve, United States Marine Corps, and United States Air Force units—mostly on rotational 2-week training cycles. In all, approximately 12,000 personnel, from all branches of the military Services and civilian agencies, contributed their expertise and labor to make the dream become reality.

The Metlakatla Indian community celebrates completion of the road.

Safety

While building the road was an extraordinary humanitarian mission, an equally impressive achievement is the safety record—*not one case of a lost limb or loss of life during the 10-year project.* An initial accident probability analysis performed by the United States Army Maneuver Support Center (MANSCEN) Safety Office, Fort Leonard Wood, Missouri, in 1999 identified that statistically, 17 fatalities could be expected over the programmed 10-year project. Commanders developed an aggressive risk analysis of the hazards, which included personnel inexperience, adverse weather conditions, water operations, blasting and quarrying, heavy equipment operation in mountainous terrain, clearing of vegetation, quantity and condition of equipment, and supplies.

Change became the norm: weather conditions changed by the hour, personnel availability fluctuated from day to day, and there were equipment shortages and a lack of supplies,



This bridge was constructed to accommodate a scenic stream and waterfall from the mountains above.

Personnel faced enormous challenges while drilling and blasting for the roadway.

all creating an ever-changing set of challenges. If there ever was a testing ground for the risk management process, Operation Alaskan Road was it. Risk assessments were prepared, revised, and reviewed continuously. Assessments were briefed to everyone, every day, and followed explicitly. Oversight took on a new definition as every member of the team monitored all operations; everyone was a safety officer. And it worked, but it did not come easily.

Challenges

Because Annette Island has no infrastructure outside of Metlakatla's city limits, personnel, equipment, and supplies had to be brought to the island by barge or boat. There were many challenges.

By Sea. Equipment and personnel were transported by military watercraft several times every day. Global Positioning Systems (GPS) were installed to provide safer and more efficient travel routes. Prior to departure of any watercraft, "man overboard" drills were conducted and briefings were presented to ensure that all passengers knew exactly what to do in the event of an emergency. Water temperatures were extreme, and a passenger who fell overboard would quickly become incapacitated from the cold.

By Land. Access to the coastal project sites by land was a rugged, one-lane pioneer logging road cut into the steep mountainside during 1960s logging activities. Because of changes in elevation, rain quickly became sleet and snow midway through the 45- to 60-minute drive. During the first year of construction, vehicles frequently met nose to nose on treacherous mountain passes. To alleviate the difficulty this was creating, a two-way traffic pattern was implemented to keep everything flowing in only one direction at a time. Speed limits were established and strictly enforced. Radio communications were improved, and military police were assigned to provide better tracking and movement of equipment and personnel.

Equipment Maintenance and Fueling Operations. Hemlock Bay consisted of a K-span building that housed the maintenance facility, plus there was a motor pool facility and a fueling point. A vehicle junkyard was the most frequent source of spare parts, because shipment of new parts took precious time. The Marines, who operated the bulk fuel point, received fuel deliveries by barge. Fuel trucks then delivered fuel to equipment on the project sites and were in constant movement.

Medical. Annual rainfall in southeast Alaska averages 13 feet. Personnel were highly susceptible to what became commonly referred to as "the Ketchikan crud," an affliction characterized by upper respiratory and/or gastrointestinal upset. Medical officers were added to the duration staff, substantially improving the degree of first-line medical treatment. Medics staffed ambulances at the job sites to provide emergency care for workers. The United States Coast Guard, located in Ketchikan, treated illnesses or injuries that were more serious. Chaplains were always on the job site, providing not only spiritual inspiration but also hot soup and hot chocolate, which dramatically improved worker morale in the cold and rain.

Utilities. All electricity had to be generated on-site. Base Camp Wy Wuh consisted of Southeast Asia (SEA) huts that housed administrative offices, barracks, warehouses, tool rooms, a post exchange/base exchange (PX/BX), a dining facility, showers and latrines, and laundry facilities. A water treatment plant was constructed to produce clean drinking water, and a wastewater treatment plant was constructed as well. Military technicians monitored all operations and equipment to ensure the health and safety of personnel at the base camp.

Wildlife Considerations

Eagles are abundant on the island, and strict protection of their habitat by the Fish, Game, and Wildlife Service ensures their continued survival. Military operations were conducted while carefully observing the habitat of indigenous animals, plants, and wildlife. If an eagle were nesting, operations would be suspended pending the hatching of the chicks.

Environmental Considerations

An agreement was made with the Metlakatla Indian Community that the island would be as environmentally unspoiled upon departure as it was when the project started. The fuel point and maintenance facilities were in continuous operation, providing fuel to equipment by day and receiving barge shipments of replacement fuel by night. Even in the hurried pace of repairing equipment, any products spilled were immediately remedied. All vehicles were equipped with spill kits to use if they encountered a spill. Rank did not matter when a spill was discovered; it was reported and taken care of by personnel in the area.

Project Success

All hardships aside, Operation Alaskan Road provided participants an experience that one may encounter only once in a lifetime. It's not often you go to work surrounded by scenic mountain vistas, eagles in their natural habitat, clear blue lakes, and a serene beauty that can only be Alaska. The overwhelming safety record is a direct reflection on strong command oversight and individual commitment to success. The success of this project is absolute proof that risk management, when conducted properly, can produce dramatic, positive results.

On 6 August 2007, the road was turned over to the Metlakatla Indian Community in a lavish day-long celebration filled with native dancing, music, and cuisine. Military Service members were finally able to meet and visit with the people for whom the road was built. Until now, only a few staff members had been able to visit the village by boat. The Federal Highway Administration will complete the remaining paving, striping, guardrails, and road signage.

On 15 September 2007, the Missouri Army National Guard lowered its flag; the military mission was complete. Approximately 12,000 military Service members constructed a lifeline to the mainland for the people of the Metlakatla Indian Community. Training in a real-world setting provided the participants an opportunity to experience conditions impossible to replicate in a training facility.

During Operation Alaskan Road, nearly the entire length of the road had to be cut out of the side of the mountains.

But that's not where this story ends; to all those who participated, there is a sense of being a part of something you can't quite name: the inner pride of knowing all the hard work will significantly enhance the quality of life for a small group of Alaskan natives for generations to come. When asked what they would do with the road, the tribal elders replied, "We don't know yet, but our children will!"

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Endnote

[1] Muskeg, or peat bog, is like a soggy blanket that covers more than 10 percent of southeast Alaska. Consisting of dead plants in various stages of decomposition, it provides a home for a variety of plants that thrive in the wet, acid soil. In the summer, the flowers on many of them provide a carpet of soft color that contrasts with the muted greens and browns typical of muskeg. The soil conditions prevent large trees from growing, although stunted shore pine, cottonwood, some species of willow, and black spruce can be found. Stepping on muskeg is like stepping on a sponge, and the holes that form in it can be quite deep and dangerous. Construction in muskeg-laden areas sometimes requires removing the soil and filling the area with gravel. If the muskeg is not completely cleared to bedrock, then its high water content will cause buckling and distortion from winter freezing, much like permafrost.

Note: For more information on Joint Task Force Operation Alaskan Road, go to <http://www.elmendorf.af.mil/alcom/alaskanroad/index.asp>.

THEATER CONSTRUCTION MANAGEMENT SYSTEM: TIME TO RAISE THE STANDARDS

By Lieutenant Colonel Joseph D. Tyron

By now many senior engineer leaders have completed one or more tours in Afghanistan or Iraq and have been responsible for construction on one level or another. As many of us return for a second or third tour, we often go back to see the legacy we left. Some of us marvel at our work, while others think, "If I could do it over again, I would do it differently." We are now at a point where we need to challenge the presumption that our standards for theater of operation construction have been correct. Does it make sense in the Central Command (CENTCOM) area of responsibility to build structures out of wood? This article will give some reasons why we have pursued this current course and why we should change our policy and perhaps our doctrine as they relate to the counterinsurgency fight. It also leads us down the road of how we need to train our junior leaders to be successful in fighting our current and most probable future conflicts.

Most engineers have been involved in troop construction in Afghanistan and Iraq and have seen a lot of problems with continued construction of wooden buildings in the harsh desert environments. The larger problem is that the temporary nature of these structures may send the wrong message to our coalition partners, as well as our enemies, about our commitment to win. One could argue that an American force that builds structures like Southwest Asia (SWA) huts is not committed to fight a long counterinsurgency or commit to a national support effort.

Beyond the question of appearances, there are many other valid reasons to build structures that endure. We should change our materials from wood to local materials for several reasons: availability, suitability, and transportation of materials; pest problems; fire protection issues; and protection from indirect fire. Using local materials solves many of these issues and also addresses questions of life-cycle costs, quality-of-life issues, transportation limitations, economic stimulus through procurement of materials and labor, and the issue of eventual transition of facilities to the host nation.

History

How did six months become the expeditionary standard for construction? Over the past 30 years, very few conflicts or operations have lasted less than six months. In Vietnam, most U.S. forces operated out of forward bases that were built to expeditionary standards but which always had logistics and support bases that were designed for 5- to 10-year operations. Even shorter conflicts such as Desert Shield and Desert Storm lasted longer than six months. As we continue operations into the seventh year in Afghanistan and the fifth year in Iraq, it is time to challenge these standards and build the structures we need for the wars we actually fight.

20th Engineer Brigade combat patch

When I attended the Engineer Officer Basic Course in 1991, we were on the cusp of the revolution of automation at the tactical construction level. The traditional method used the Army Facilities Component System (AFCS) charts to plan and design. The charts, with ¾-size drawings of SWA huts and other standard structures, were used to determine bill of materials requirements, additional tools required, haul assets, and projections for man-hours. Most of us were told that we would soon be migrating to the Theater Construction Management System (TCMS), which would automate the process with embedded computer-aided design and scalable and site-adaptable drawings. It was a great improvement over AFCS, but it was decided that our focus as engineers would be on breaching and mechanizing our force. I remember a senior engineer leader asking me, "Do you want to be a plumber or a killer?" That philosophy worked during Operation Desert Storm, but has not been effective during Operation Iraqi Freedom and Operation Enduring Freedom. I'm sure today's senior Army leaders would prefer that engineers be as good at plumbing as they are at killing.

During the late 1980s and early 1990s, the time we should have devoted to construction was diverted to training on combined arms breaching and other tactics used at the National Training Center at Fort Irwin, California. Sadly, much of the construction program of instruction in our professional military education courses was deleted. A six-month facility lifespan for an expeditionary theater construction standard persisted even though we moved toward many missions that would have inherent reconstruction tasks.

The Roman Empire was one of the greatest of all times. There can be arguments about territorial gains, military conquests, and advancements in science, law, culture, and architecture, but few historians would dispute the idea that the Romans mastered all things in their sphere of influence. Of particular note was the Roman commitment to building throughout their empire. Nearly everywhere they went, they left lasting structures. One important idea from Roman military operations is relevant to the theater of operations construction standards today: the building of high-quality, long-lasting infrastructure in contested territories. Roman legions built great structures, roads, aqueducts, and permanent structures using locally available labor and materials. These structures contributed to the material welfare of the province or territory but also left a more lasting influence on the local culture's architecture and social organization.

We are certainly not the Romans, but we can take a lesson from the legions on building structures to last. What does a six-month life-cycle structure say about America and our commitment to the region? Clearly, whether it is popular or not, nation stability operations and reconstruction operations are going to be in our doctrine in order to terminate wars in a way that actually achieves our political objectives and allows us to engage and support emerging allies.

As obvious and logical as the historical reference may be, we still primarily use wooden structures for coalition facilities in Afghanistan and Iraq. Let us look at the reasons of concern over this standard of construction.

- Wood is not a building material found in large quantities in Afghanistan, Iraq, or the Horn of Africa. It doesn't hold up well in harsh, dry climates where intense heat and low humidity distort wood and cause quality problems.
- Central Asia and Iraq are arid regions and lack water resources and infrastructure. With that in mind, we need to take fire protection more seriously. Fires in wood

Soldiers from the 20th Engineer Brigade prepare to deliver wood throughout the battlefield to support engineering projects.

structures and tents can be devastating, and the danger doesn't have to come from a careless Soldier; it can be poor electrical work or indirect fire.

- Termites are an unseen threat. On average, we will have termite problems within six to twelve months of building a wood structure in these regions.
- A large amount of costly lift assets is required to move lumber to the region. Our supply lines in Afghanistan and Iraq are long and vulnerable. Class IV supplies are difficult to transport, compete with other high-priority supplies, and put Soldiers' lives at risk by increasing their exposure to dangers on the roads of Afghanistan and Iraq.
- Indirect fires continue to be a problem, and rocket and mortar attacks are an everyday event in both theaters.

Based on these concerns, most people can understand why our system should change, but to what standard and when? There is a time and place to use wood, but it is more cost-effective to go directly from tents to concrete and block buildings. It will be helpful to qualify a couple of inverse rules that apply in Afghanistan and Iraq. First, local labor is cheap and materials are expensive. Of course this seems obvious, but in the United States it is completely the opposite. Second, construction materials may not always be readily available and lead times are longer than in the United States or Europe. Seen through this lens, it will be easier to understand the logic of some of the following arguments.

In our current active theaters, the predominant local construction material is not wood but block and stone. Block and concrete construction is ideal for the environment in the Middle East and Central Asia. It is the predominant medium for most commercial construction. There are not many wood structures in Afghanistan and Iraq because wood has primarily been for support components and fuels in these countries. All dimension lumber has to be imported, but block is made nearly everywhere in the Middle East and Central Asia. Cement and rock products are in abundance all over the region, and there is an experience base in working with these products. Although their techniques make less efficient use of labor than our own, this is not a serious problem since labor is the least expensive component of the construction process and a coalition goal is to maximize local labor.

Aside from the obvious cost of building and rebuilding with wood, the issue of operations and maintenance rears its head. Every time a wood structure has to be rebuilt, there is a need to rewire and replumb. This raises the costs exponentially, and the problem is worse when we consider we are working on the third iteration of facility rebuilding or replacement in many locations. In some instances, Afghan and Iraqi soldiers have better facilities than American Service members.

Protecting wooden and light metal facilities from indirect fire is costly, but that problem could be solved by constructing buildings with block and concrete deck roofs. This would lower the risk of fire hazard and conserve fire protection assets while protecting our forces against mortar, rocket, and artillery fire. The problem of construction technique could be overcome with training and supervision to get a good quality product. It would also cut down on transportation costs, because block can be produced on-site and in the local economy. Instead of having to buy the most expensive imported building materials available in the overseas market, U.S. forces could buy inexpensive, locally-produced building materials right outside the gate. U.S. forces are constantly looking for programs to stimulate economic development in nation-building operations. Unfortunately, sweeping streets and cleaning canals does not do enough to stimulate an economy. If we employed more local nationals and taught them to build to Western standards, the benefits would be immense. In addition to improving war-ravaged countries, it could create a workforce that could move throughout the region and help contribute money to the economies of their home countries. This can be seen in the large numbers of third-country nationals working in Korea, Turkey, Indonesia, China, Saudi Arabia, and Egypt.

In a previous assignment with the United States Army Corps of Engineers (USACE) in Afghanistan, we built many of our projects for the Afghan National Army (ANA) with local materials such as stone and with cement block made on-site. The projects employed more than 5,000 Afghans across the country and gave the ANA lasting facilities.

The last and most important outcome of using local materials might be transition, because that is our ultimate goal in Afghanistan and Iraq. Our ticket out of these theaters of operation is a long-term security apparatus. Changing our theater-of-operation construction standards would provide a short-term sustainment facility for coalition forces and would represent capital in the eventual transition of U.S. forces. A sustainable city with electricity, water, and waste water management would be a much more attractive bargaining chip than a base of aging and dilapidated SWA huts.

The Way Ahead

What is the way ahead for military engineers? First, we need to review and revise construction standards in the CENTCOM Sand Book and the TCMS. Our standards need to be flexible enough to consider all factors. Cost, life cycle, transportation assets, fire protection, force protection, external commitment to our coalition partners, and host nation economic stimulus need to be addressed. Senior leaders should study current theater of operations construction standards in order to rectify the problems addressed in this article.

Second, we need to change our wartime construction paradigm. We should plan to go for the long term—3 to 5 years, including post-conflict operations and stabilization operations—and should adopt a two-prong construction strategy:

(Continued on page 57)

THE ENGINEER STAFF PENTATHLETE:

Staff Leadership and Dimensions for Success in a Transforming World

By Lieutenant Colonel Adam S. Roth

As I returned from the United States Army Engineer School's Precommand Course, I reflected on the term that kept coming up during the course – *pentathlete.* (See editor's note at end of article.) I remember the best-known of all modern pentathletes, General George Smith Patton, Jr.—who competed at the 1912 Summer Olympics in Stockholm, Sweden—but I tried to bring the term into a more contemporary setting.

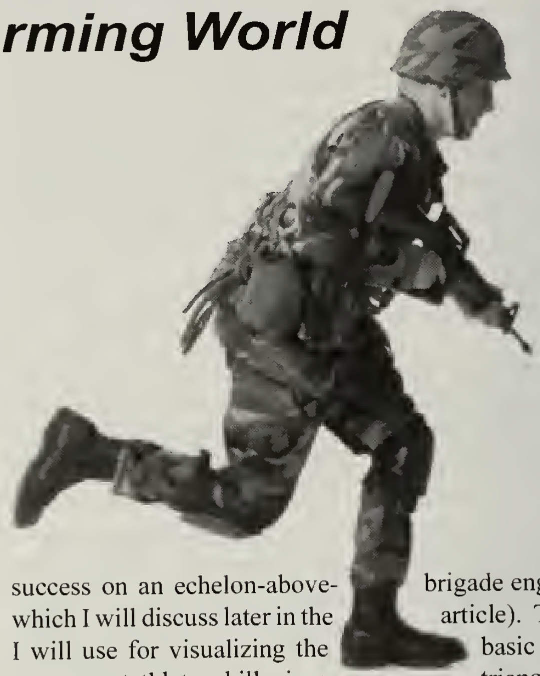
At the time I attended the Precommand Course, I served as the Deputy G3 of the 412th Engineer Command (ENCOM), an Army Reserve unit headquartered in Vicksburg, Mississippi. The G3 section had the following sections (each headed by a lieutenant colonel, a major, or a senior civilian):

- Operations
- Training
- Mobilization and Readiness
- Force Management
- Emergency Operations Center
- Budget and Funds Management

In the past 24 months, the 412th experienced one of its most intense time periods—a veritable "perfect storm" of major operations, including the Army Reserve command and control (ARC2) transformation with an end state of three subordinate brigades, located in an area that spans the tip of Maine to the tip of Florida and all the way westward to the Mississippi River. The perfect storm also included engineer transformation to modularity, which transformed more than 80 percent of those subordinate units into separate "AA" entities as low as the company and detachment levels. The last "front" of the perfect storm was support to the War on Terrorism, in which the 412th ENCOM mobilized not only multiple rotations of staff to support the United States Army Corps of Engineers (USACE) Gulf Region Division, but it also included a major mobilization of a subordinate battalion that was fast-tracked through transformation while at the mobilization station.

Army Reserve Pentathlete Triad

I tried to take this environment, especially for an Army Reserve unit, and put it into the context of the pentathlete skills required to succeed. After great reflection, I realized that the Citizen-Soldiers in the Army Reserve are pentathletes in their own right (aside from the pentathlete skills required for success on an echelon-above-brigade engineer staff, which I will discuss later in the article). The vehicle I will use for visualizing the basic Army Reserve pentathlete skills is a triangle with two added dimensions (a triad), which is shown in Figure 1.



Competencies

The triad represents balance in a pentathlete's life. Everything we do in life has balance, even more so as a Citizen-Soldier. Through the Army Force Generation (ARFORGEN) Model, the Citizen-Soldier has the added responsibility to become a Citizen-Warrior and then a Warrior-Citizen through the mobilization and deployment process.

Army Reserve pentathletes must possess the following five competencies, and they also need to maintain them in balance:

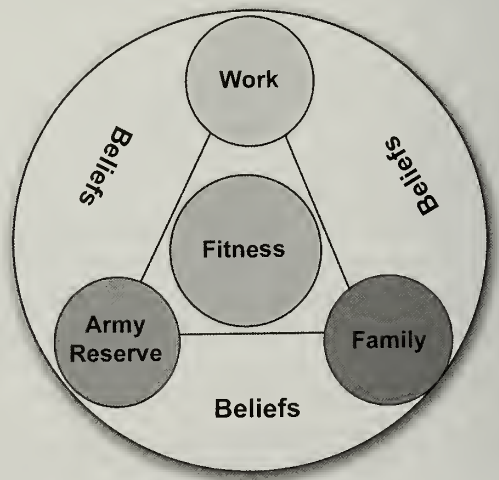


Figure 1. Army Reserve Pentathlete Triad

- *Work.* Civilian employment responsibilities (enable us to maintain a standard of living).
- *Family.* Family responsibilities (why we are here).
- *Army Reserve.* Army Reserve responsibilities (why we serve).
- *Fitness* (using a healthy lifestyle to maintain our bodies). This is in itself a challenge because most civilian employers do not put "PT" on the work schedules.
- *Beliefs* (how we hold all of the other dimensions together). When speaking of beliefs, we are also talking our value system, and the Army Values are at the forefront. I am also speaking of the values inculcated in each pentathlete through a family support network. Lastly, our beliefs—be they spiritual, metaphysical, or otherwise—are a strong driving force in keeping the entire pentathlete triad in balance.

Using the basic pentathlete triad, I then thought of the basic competencies that successful staff officers and leaders I observed throughout my career required in order to be successful, and how those competencies were applied in the "perfect storm" environment at the 412th ENCOM. The majority of the G3 staff had deployed at least once, either prior to or during my tenure as the Deputy G3, creating a core of staff officers and noncommissioned officers who became a division G3 staff overnight, despite being manned at a level between a battalion or brigade S3 staff.

Bosses

Bosses were even more crucial in this analysis. Running concurrent operations on three separate continents, while also maintaining enduring (and growing) command and control missions, did not leave much room for intense supervision. The one key, more than any other, for the G3, as well as for the chiefs of subordinate sections, was the establishment of a right and left limit. The challenge in establishing that right and left limit, as done primarily in initial face-to-face counseling, is also ensuring that sometimes connectivity between sections within the G3, as well as between staff sections, may portend "going out of their lane." The key point, especially for younger field grade officers on their first echelon-above-brigade staff assignment, is to know the difference between coordinating activities and directing activities. Explaining this difference is the key to managing expectations and will ensure success as the new staff officer embarks on the route of developing advocates and enabling connectivity.

Engineer Staff Pentathletes

Looking at the breadth of knowledge required for a staff officer on an echelon-above-brigade staff, especially in the G3, it was pretty easy to say that what we need are officers who have had company command, are Command and General Staff Officer Course/Intermediate-Level Education (CGSOC/ILE) Program graduates, and possess the very nebulous term "operators." I have broken down the competencies (either brought to the table or developed during their tenure) that have been critical in their personal success, as well as the joint success of the G3 section as a whole (see Figure 2).

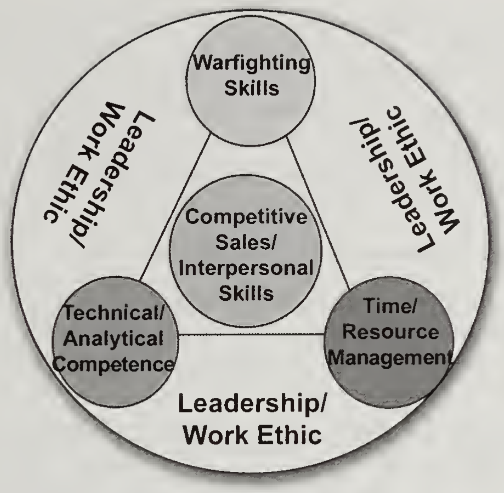

Warfighting Skills
Leadership/ Work Ethic
Leadership/ Work Ethic
Competitive Sales/ Interpersonal Skills
Technical/ Analytical Competence
Time/ Resource Management
Leadership/ Work Ethic

Figure 2. Engineer Staff Pentathlete Triad

Breaking down the triad into individual parts, there are many facets to the success at the echelon-above-brigade staff level. Whereas each member of the staff may not have had all competencies fully matured, this model has served as a goal to strive for during the duration of assignment within the G3.

Warfighting Skills

Each team member was part of the 412th ENCOM, which serves as an operational command under the ARC2 construct. This meant that we were not a continental United States (CONUS)-based table of distribution and allowances (TDA) organization, but rather had responsibilities supporting major contingency operations in both the European Command (EUCOM) and Pacific Command (PACOM) areas of responsibility.

Warfighting Mission. A major segment of the 412th ENCOM mission was to support United States Forces Korea in the defense of the Korean peninsula. Members of the G3 staff routinely deployed to the Republic of Korea to support either of two exercises: *Ulchi Focus Lens* or *Reception, Staging, Onward Movement & Integration (RSOI)*. This ensured that all team members initiated their fluency with the language of war at the operational level, not only from an engineer perspective but also on how the engineer is capable of setting conditions for success for operational logistics through assured mobility as well as operational protection.

Development and Maintenance of Battle Rhythm. The development and maintenance of a battle rhythm in itself formed the "heartbeat" of the ENCOM. Situational awareness and synchronizations of battle rhythms at higher levels, as well as subordinate units and internal to the command, were an ongoing process to ensure that the 1/3 - 2/3 rule was enforced and that there was a timely response to all coordinating agencies.

Troop to Task. Assisted by the ARFORGEN Model, understanding of unit capabilities in a modular world (clearance, vertical, horizontal, equipment support company, etc.) and then applying those capabilities along lines of time, as well as combat power, enabled greater battlefield visualization for the G3 as to how far the force can go without reinforcement.

Technical and Analytical Competence

This forms the basis of how engineers (irrespective of baccalaureate degree discipline) think, using logic, and are able to take the abstract, make it concrete, and turn it into reality.

Rise Over Run. Whereas the 412th is an ENCOM, it cannot always depend on a degreed engineer with a professional engineering license to develop a design directive in either a training or deployed environment. Engineer staff pentathletes have to be able to satisfy the requirement using available means (including Theater Construction Management System [TCMS] software and the Engineering Infrastructure and Intelligence Reachback Center [EI2RC] through USACE) to provide subordinate units the rough order of magnitude required from both a scope-of-work and a bill-of-materials perspective in order to accomplish what is basically required, rather than proscribe the exact 11 over 14 rise-over-run solution.

Force Structure. Engineer transformation to modularity became a major driving factor in all operations. Engineer staff pentathletes needed to not only understand the new structures and standard requirement codes (SRCs), but they also needed to understand the basis of activation, conversion, and inactivation, as well as how a new unit is manned, trained, equipped, stationed, and resourced. It is much more than just being able to read a modified table of organization and equipment (MTOE).

Doctrine Development. The 412th ENCOM, in conjunction with USACE and the Engineer School, has been collaborating on the revision of many doctrinal publications, to include the new FM 3-34, *Engineer Operations*. Engineer staff pentathletes should bring with them a breadth of experience that will not only affect the operations of today but also have the foresight to reflect on past experience to shape the battlespace of tomorrow.

Technology Savvy. Engineer staff pentathletes must be able to master the many complexities of the standard Army computer software suite (PowerPoint® Rangers included). But they also must be able to harness the technology in order to share vast amounts of information. They can do this by performing the role of "webmaster" for a knowledge center on Army Knowledge Online (AKO) or by developing a SharePoint® site that allows access to the Army Reserve network for many of the troop program unit members of the Army Reserve who do not have dedicated access. Engineer staff pentathletes should also know the basics of some of the teleconferencing suites available, to include the USACE TeleEngineering Tool Kit. To stay connected is to stay relevant.

Time and Resource Management

Much of what is performed at the ENCOM level is management of resources. Engineer staff pentathletes have to know the basics of managing those resources (as well as being able to ask for more, or worse, to say no).

Training Readiness Oversight. For engineer staff pentathletes to know, based on the ARFORGEN Model, what level of resourcing a particular unit receives is one part of the puzzle. At the major subordinate command (MACOM) level, ensuring that units have the basics of transportation, ammunition, lodging, and observer-controllers involves setting conditions for the management of those programs. Having an understanding of contracting, as well as dealing with commodity managers, helps ensure that these resources are forecasted and eventually executed.

Meetings. Having more and more constituencies to become involved with—in order to attain staff synchronization, meetings (including face-to-face, teleconferences, video teleconferences, and full-blown conferences)—became a way of life for the G3 section. Aside from the mandatory agenda and objectives that guided almost every engagement, the most important was a Monday morning meeting referred to as *Festivus* (as in Festivus for the Restivus). The purpose of this meeting was to provide a sounding board for development and refinement of commander's guidance. The key to the event was that everyone had an input, and the absolute best development and mentoring came from those sessions and created a better product and process with buy-in from all.

Funds Management. Engineer staff pentathletes frequently become the program managers for major exercises or conferences. Therefore, all officers need to attain a basic level of financial management skills. Knowledge in the development of field budget estimates, unresourced requirements, and of course monitoring of funds execution became daily staples for the engineer staff pentathlete. Only later in the game were we able to rely on dedicated finance personnel to assist in these processes, thus already preparing those engineer staff pentathletes for the lean staff of the contingency operations (CONOPs) environment.

Competitive Sales and Interpersonal Skills

The single greatest task for any engineer staff pentathlete was the ability to sell oneself and one's own ideas. As engineers, we become complacent in knowing that the answer is 11 over 14, as stated earlier. We lost the bubble on how to sell that though, especially to diverse groups that may not know (or appreciate) what rise over run is. Pentathletes found themselves engaging in intense networking at every opportunity, not only to be known but also to get on the radar screen of those who were decision makers. With this also came relationship management and knowing how well that alliance would blossom. The most important part of "selling" we learned during this period was how to communicate to senior-level commanders, in terms of risk, if "A" did not happen, what would be the second- and third-order effects of that action.

Leadership and Work Ethic

The key element to staff synchronization was the leadership required to make it happen. It transcended "walking the walk" but also meant going outside of the G3 "lane" to understand the battle rhythms of other sections (and subordinate units) so as not to be too intrusive and break the golden 1/3 - 2/3 rule. Additionally, engineer staff pentathletes had to know the guidance, intent, and battle rhythm of the command group to ensure that subordinate execution met the commander's expectations. Engineer staff pentathletes also needed to be able to provide counseling to other team members (in writing), reward those who excelled and, most importantly, look out for their development.

Summary

To be sure, this was the most rewarding assignment of my career—in a career that continues to amaze me that each new challenge tops the previous one. The complexities that we as engineers find ourselves in, either while deployed or preparing for the next deployment, require a great deal of depth, transcending original models of technical and tactical competence. The staff officer of today has to speak and understand the *lingua franca* of the entire staff, make on-the-spot assessments, and sell it in terms of "what's in it for me," as well as in terms of risk to commanders at all levels. I hope that through this article, the hard work of the 412th ENCOM G3 section may serve as a guide for some future (or current) engineer staff pentathlete and provide refuge in the next "perfect storm."

Lieutenant Colonel Roth was the Deputy G3 of the 412th Engineer Command at the time this article was written. He has deployed to Iraq as the executive officer of the 458th Engineer Battalion and has commanded a combat heavy engineer company. A graduate of the Command and General Staff College, he holds a master's in mechanical engineering from Boston University. He now commands the 844th Engineer Battalion in Knoxville, Tennessee.

Editor's Note: Per the Chief of Staff of the Army, the term "pentathlete" and "multiskilled" are no longer the preferred way to describe the broad capabilities the Army needs. The preferred way to describe the type of leaders the Army needs is "leaders skilled in their core warfighting and leader competencies who also have a variety of broadening experiences." However, this does not detract from the essence of Lieutenant Colonel Roth's article, because he clearly articulates the need for engineers to be skilled in engineer competencies, while highlighting the importance of having a broad experience base.

("Theater Construction," continued from page 53)

- Develop and use expeditionary construction standards in the beginning of an operation, including deployable base camp packages that are already available.
- Plan, develop, and build—in concert with the tactical situation—durable facilities that can be supported with limited assets. Don't build temporary structures that become permanent.

We should modify the CENTCOM Sand Book standards and go to permanent construction sooner, when it is clear that the national commitment will be long-term. Experience demonstrates that this level of commitment is required to achieve war termination or accomplish political objectives.

Finally, we need to update our collective skill sets in our schools to include instruction on building in block and other concrete vertical products. Our technical prowess should meet our tactical prowess on the combined arms team. That means increasing the investment in our training base and working with the latest industry techniques to keep our personnel in step with the construction industry. This change needs to happen in all engineer advanced individual training and officer and noncommissioned officer education courses. Also, at the higher staff levels, we need to send junior officers to assignments with USACE, public works, and prime construction contractors so they can gather best practices and disseminate the knowledge to the Regiment. Some officers in the Engineer Regiment must become warranted contracting officers to give ourselves a self-help capability to advise maneuver commanders on contract expectations and to more aggressively pursue contracting actions. This seems like a tall order, but it is already happening in the combat zones of Afghanistan and Iraq in a variety of assignments. We simply need to document our combat successes and failures and go with what works.

Lieutenant Colonel Tyron is the Deputy Commander, 20th Engineer Brigade (Combat) (Airborne). His previous assignments include Chief of Current Operations, XVIII Airborne Corps; Deputy Garrison Commander for Transformation, Fort Bragg, North Carolina; Deputy Commander, Afghanistan Engineer District, USACE; and Deputy Commander, St. Louis Engineer District, USACE.

Contributors

Lieutenant Colonel Greg Kniesler, Commander, 673d Construction Management Section, attached to the 20th Engineer Brigade. In civilian life, he is the director of facilities engineering at Mount St. Mary's University, Maryland.

Lieutenant Colonel Paul Huszar, Operations and Training Officer, 20th Engineer Brigade (Combat)(Airborne). He has previously served as Executive Officer, Operations and Training Officer, and Deputy District Engineer for Military Programs in the USACE Sacramento District.

TRAINING IN THE FIGHT-EXPERIENCES IN AFGHANISTAN

By Major James X. Francis

Training a unit can be difficult even in a peaceful stateside setting. As the governments of Afghanistan and Iraq are stood up, however, our Soldiers are being tasked to train foreign soldiers in war zones. This presents special problems that need ingenious solutions. Issues such as culture and language are quickly apparent and must be dealt with. Other issues, such as leadership and equipment shortages, are not so easily managed. To combat these problems in Afghanistan, the United States Army has been sending Army National Guard Soldiers to act as "embedded team trainers" (ETT) for the Afghan National Army (ANA). While these two-Soldier teams are primarily trainers, they also serve as advisors and liaisons for combat operations. These teams are supposed to be the link between coalition troops and the ANA, enabling the Afghans to take more responsibility for their own defense.

Issues

During the past year, two engineers from the Missouri Army National Guard (MOARNG) were engaged in training the engineers of the ANA's 1st Brigade, 205th Corps. Located in the volatile southern region of Kandahar, the Afghan soldiers had been used as either infantry troops or laborers for coalition projects, despite their engineer training. The job of the MOARNG engineers was to reverse this trend.

Combat itself was the major training hindrance. The spring offensive of the Taliban began in March 2006. To counter this, coalition forces began their own series of offensives. The conventional wisdom was to put an "Afghan face" on the operations but, unfortunately, the Afghan infantry units were farmed out to United States Army Special Forces units. Therefore, the bulk of the offensive infantry missions fell to the ANA's combat support soldiers—the headquarters, engineer, and artillery units. The official manpower and equipment of the ANA units would have made them well-suited to support both combat and construction operations. However, just as in any organization (much less a developing army like the ANA), the reality does not necessarily equate to the ideal on paper.

Leadership was another problem. Afghans still have a "warlord" mentality, which means that subordinate leaders were hesitant to do anything that the company commander did not expressly order. This and other issues affected the leadership of the junior officers. Part of the complication was due to the Afghan culture. Another part was the fact that different segments of the ANA were taught according to different philosophies. The French were in charge of teaching the officers, while the British and Americans were responsible for training the enlisted soldiers. This caused a difference in approach to leadership within the ANA.

Solutions

The first major issue to solve was the misuse of the engineers. Engineers are unique in that they can have an impact on both combat and reconstruction efforts. The more the local leaders and villages could see their government working for the good of Afghanistan, the more local support there would be for the government. With the engineers leading reconstruction efforts, the government could be seen as a beneficial force rather than just another warlord. Unfortunately, the ANA and coalition leaders were focused on the kinetic effort and ignored the nonkinetic fight. Due to ongoing operations, the ETTs performed their ANA training while in a combat environment.

ANA engineers erect solar-powered lamp posts.

After four months of combat operations and with little or no training possible, word was received that the 1st Reconstruction Task Force (Australian) was asking for Afghan support in the province of Uruzgan. The ETTs pushed hard to deploy with the ANA soldiers for two major reasons. First, that would pull the engineers out of the reach of the local corps commander, who repeatedly committed them to infantry combat operations. Second, in exchange for supporting the reconstruction efforts, the Afghan engineers would receive training assistance and support from the Australians, which would establish a good symbiotic relationship.

The Australians put forth a training program and used their resources to teach the ANA soldiers skills such as carpentry and masonry, as well as selected combat skills. These skills were put to the test since the Afghans would go with the task force and assist in construction or help provide security. The results were so positive that remote village elders approached the ANA soldiers, promising security for coalition forces if the ANA would assist their villages. The International Security Assistance Force (ISAF) Southern Regional Command in Afghanistan cited the effort as a model of coalition and Afghan troops working together. A steady supply of positive reports for both the American and Afghan leadership maintained the mission and maintained distance from the Afghan command.

The first missions included security and checkpoints, as the two militaries learned each other's strengths. As confidence in the ANA soldiers' abilities grew, the missions branched out to minor carpentry tasks under Australian supervision. Eventually, the ANA soldiers were given missions under their own supervision as part of the reconstruction projects. At all times, the Australians kept the American advisors as part of the planning process, fostering a true coalition effort.

Partly due to the culture, partly due to their training, progress among the officer leadership abilities was limited. On the other hand, the noncommissioned officers (NCOs) developed quite well and earned the respect of their men by their actions and abilities. The follow-on American advisors were briefed and expected to focus on the officer training portion.

Because of the poor supply system, replacements for broken equipment were difficult to get through the ANA system. The Australians were excellent about helping out and

Australian, American, and Afghani engineers repair a mosque.

bought tools for the trainees. While using this "backdoor" technique, the ETTs continually pressed the ANA officers and NCOs to push paperwork through the Afghan system to expose where the problem lay.

Results

Overall, the solutions to the problems enabled successful training and missions. The year highlighted the ANA engineers' construction—as well as combat—abilities and their success at reaching out to the local communities. The cooperation of the Reconstruction Task Force and the ANA was beneficial to both sides and showed the advantages of true partnership. More successes of this nature in both Iraq and Afghanistan will allow national forces in both places to take more control of their own defenses and require fewer rotations for American and coalition troops.

Major Francis is the engineer officer for the 110th Combat Support Brigade, Missouri Army National Guard. His past assignments include engineer trainer in Afghanistan; commander of the 235th Utilities Detachment, Missouri Army National Guard; and staff engineer section operations officer for 1st Corps at Fort Lewis, Washington. He holds a master's in history from Southeast Missouri State University.

MODULAR ENGINEER STRUCTURE IN DIVISIONS

By Colonel Jeffrey R. Eckstein

I recently completed a deployment to Iraq as the Division G7 and the Division Engineer for the 25th Infantry Division, which served as the Multinational Division–North (MND–N) headquarters at Contingency Operating Base (COB) Speicher and covered an area equivalent to the size of Pennsylvania. The division converted to the modular structure and deployed after a mission rehearsal exercise and, during the tour, it commanded and controlled four to six modular brigade combat teams (BCTs). From my perspective, I think the modular engineer force structure is about right. I offer the following observations based on my 15 months in Iraq.

Staff Organization

The engineer expertise on the division staff in the modular structure resides in the two tactical command posts (TACs), the division operations center, and the Division Engineer cell. By the modified table of organization and equipment (MTOE), engineers support other sections within the headquarters and are not a staff section such as the G1 or G4. We did not operate this way. The Division Engineer section became the G7 Reconstruction, not the Information Operations (IO) section. The IO section was part of G3. The MTOE engineers assigned throughout the division headquarters worked within the G7. The exception was the engineer planner, who remained a member of the G5.

The G7 included the engineers, the traditional G9 section, and several civil affairs personnel. The figure on page 62 depicts the areas of G7 responsibility. The G7 section coordinated reconstruction efforts at the division level, as well as the traditional engineer and civil-military operations functions. Placing all of the engineer personnel within the G7 allowed the engineer section to battle-track, coordinate engineer support, provide resources to the BCTs, and execute nonstandard missions, as assigned. The G7 provided personnel to the division operations center and executed the traditional roles of maintaining situational awareness of the current fight, providing engineer input for the staff battle drills, and briefing the commander. The G7 also coordinated with the assigned engineer brigade headquarters and corps for additional engineer capability, as required for the mission or as requested by the BCTs.

Resourcing in Iraq is requirements-based. Many of the resources required by engineers were construction materials, particularly barriers. These were justified through the Division Acquisition Review Board (DARB) or the Joint Acquisition Review Board (JARB), depending on the monetary thresholds. The engineers provide input for the division-level approval, or process the requests going to corps for their action. In addition to the material requests, an engineer reviewed all construction requests and conducted a work classification to ensure compliance with statutory construction limits. Within Iraq, the Logistics Civil Augmentation Program (LOGCAP) is a source of base camp support. As part of our division-level review process, the Division Engineer validates all LOGCAP requests over $100,000.

The G7 in MND–N was responsible for oil and electrical infrastructure. This nonstandard mission entailed tracking the progress of improving crude oil exports, distribution of the refined product, and production and distribution of electricity. The MND–N area included one of the largest refineries and power plants in Iraq, as well as the Kirkuk oil fields. The G7 staff section provided our general officers and higher headquarters with accurate and timely oil and power information. This information assisted leaders at all levels in their engagements with Iraqi officials, resulting in improved production, security, and reliability over the course of our deployment.

The G7 also supervised the Commander's Emergency Response Program (CERP), another nonstandard mission. This involved tracking all BCT projects, facilitating the approval of projects over $100,000, funding all projects in conjunction with the G8 CERP manager, and maintaining the Iraq Reconstruction Management System (IRMS) database. This was no small task, because the division executed more than 3,000 projects in one fiscal year. Civil affairs personnel augmented the engineers in order to accomplish these nonstandard missions.

The Division Engineer section accomplished all of these tasks, because all the engineer personnel on the division staff worked for the Division Engineer in G7. If personnel work according to their MTOE assignments, the engineer contribution to the division commander and staff is limited to battle tracking and coordination for engineer support. The consolidation of engineer personnel enabled the sourcing and execution of the nonstandard task.

Multiple vs. Consolidated Command Posts

The modular MTOE for the division does provide adequate engineer staffing, but the organization supports three separate command posts, which are critical for a mobile fight. In Iraq, we did not need the capability to conduct mobile operations, so we formed one staff from the three command posts and formed new cells as required by the mission in Iraq. Over the course of 15 months, two cells did form that operated separately from the division headquarters. Although referred to as TACs, these cells supported leader engagements rather than coordination of tactical operations. Additionally, the division formed the Iraqi Security Force (ISF) cell, the improvised explosive device (IED) defeat cell, the Project Coordination Center (executed CERP), and the reconciliation cell. With the consolidation of all engineer personnel in one staff section, we supported all of these cells with appropriate coordination, as well as controlling the Project Coordination Center. The G3 controlled the other cells.

Manning

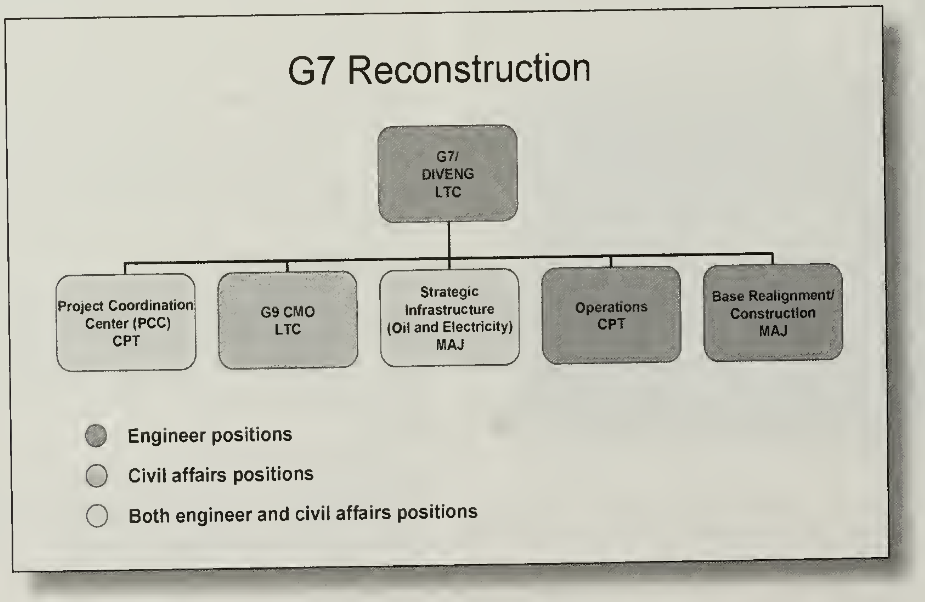
My assessment is that the MTOE for personnel provides adequate expertise and leadership to execute engineer planning, integration, and support at the division and brigade levels. Discussions are already underway to modify the organization at division and BCT levels. Unfortunately, none of the BCTs nor the division staff was manned according to their MTOEs. Non-career course graduates often filled the captain positions and career course graduate captains filled the major positions. Only one Stryker BCT had the required major, one of one. Engineer officers were in great demand as liaison officers (LNOs) and military transition team (MiTT) members and for fulfilling branch qualifications in branch-immaterial positions (brigade special troops battalion [BSTB] or special troops battalion [STB] executive officer [XO]/operations officer [S3]). The same situation occurred with captains, although not to the extent of the majors. Many of the problems we experienced with communication and coordination would be alleviated by having more senior personnel on the staff. It is critical that the brigade and division staff positions are filled at the appropriate grade, not just with an engineer. I recommend consolidation of the division engineer personnel into one section, the G7, but retain the current MTOE authorizations. At the BCT level, I am hesitant to suggest a different force structure for the officers, but I would add a construction-type noncommissioned officer (NCO).

Battalion Headquarters in a BCT

Most engineer and maneuver commands commented on how they needed more engineers and how they missed having the attached engineer battalion in the BCT. With a properly manned brigade staff, the engineer battalion headquarters is not required to support the modular BCT. An engineer battalion headquarters is appropriate because engineer elements assigned to the BCT increase based on the assigned mission set. What is not required for the one or two organic engineer companies is an engineer headquarters element. A BSTB headquarters provides the required command and control. The knowledge and experience of an engineer battalion commander within a BCT is invaluable and is a tremendous advantage. But that capability is not worth the detachment or company that comes with the commander. A better solution is to place a high-quality, potential battalion commander on the BCT staff as one of the assigned majors. At BCT level, there are either one or two engineer majors, depending on whether it is a Stryker, infantry, or heavy BCT. I suggest providing two engineer majors on the MTOE, regardless of the type of BCT.

Engineer Capability in a BCT

Another common complaint with the new modular structure is the lack of engineer capability. In Iraq, I believe our problems are not a result of modularity.


G7 Reconstruction
G7/ DIVENG LTC
Project Coordination Center (PCC) CPT
G9 CMO LTC
Strategic Infrastructure (Oil and Electricity) MAJ
Operations CPT
Base Realignment/ Construction MAJ
● Engineer positions
◐ Civil affairs positions
○ Both engineer and civil affairs positions

Engineers are in high demand in counterinsurgency operations. Because a BCT requires additional engineers to support missions, the BCT must wait, share, or simply do without the requested engineer capability. Providing additional organic capability to the BCT is not a viable solution. We must remain flexible and agile to match the engineer capability to the BCT requirements at the correct time. As BCT missions require additional forces, the BCT receives engineer forces with the appropriate command or control relationship. The only capability I would suggest is additional horizontal capability within the engineer company.

Engineer Brigade Headquarters

The one required force structure change is the engineer brigade headquarters at division level, and there are many ways to provide this command and control headquarters. I suggest an arrangement similar to that of the sustainment brigades. Each division has a habitual relationship with an engineer brigade. The current four engineer brigades on active duty are not enough. Every division in Iraq, except the surge infantry division, has had at least one engineer brigade or group assigned to it to support operations. That fact should validate the requirement. Similar to the sustainment brigades, these engineer brigades do not require organic units. The division's mission dictates the allocation of additional engineers. With the already lean organic engineer capability of the BCT, divisions will require additional engineer units for nearly every assigned mission. These modular brigades accept the additional engineer capability required to support operations. The modular engineer brigade is not integral to the division headquarters and will remain able to command and control engineer operations across the division area of operation. Typically, divisional engineer brigades provided their assigned engineer battalions to the BCTs and usually requested engineer groups as additional engineer battalions supported the division. Previously, we had an engineer command and control headquarters at division level, but we requested one more headquarters. What we really need is more company- and battalion-level capability; one engineer brigade headquarters per division is adequate.

Summary

I believe the modular concept and capability within the division and BCT is about right if properly manned. It is critical to have 100 percent manning on division and BCT staffs with the appropriate grade personnel. At division level, consolidate the engineers by MTOE into one section, nominally the G7. Provide some additional horizontal capability within the organic BCT engineer company. I would not attempt to provide the organic engineer battalion headquarters to a BCT. I would increase the number of engineer brigades in the structure to match the number of divisions and would continue with efforts to increase the engineer force structure. My experience in Iraq reinforces that we do not have enough engineers in the force structure; Engineer Soldiers deploying every other year deserve the additional force structure. The modular construct is valid and does not require major reworking or debate within the Regiment. We should first focus on bringing back engineer capability at the company and battalion levels.

Colonel Eckstein is the Chief of Staff, 25th Infantry Division, Schofield Barracks, Hawaii. He recently served in Iraq as part of Operation Iraqi Freedom. Previous assignments include Division Engineer and G7 for the 25th Infantry Division; Commander, 84th Engineer Battalion; and S3, 36th Engineer Group. He is a registered professional engineer in Virginia and Florida and holds a master's in civil engineering from the University of Washington.

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Burress, Specialist Richard B.	1st Battalion, 30th Infantry Regiment, 3d Infantry Division	Fort Stewart, Georgia
Hill, Sergeant Shawn F.	178th Engineer Battalion, 218th Infantry Brigade	Rock Hill, South Carolina
Osmolski, Sergeant John C.	2d Brigade Special Troops Battalion, 2d Brigade Combat Team	Fort Bragg, North Carolina
Skelton, Sergeant Bradley J.	1138th Engineer Company, 35th Engineer Brigade	Fort Leonard Wood, Missouri
Straughter, Specialist Matthew F.	1138th Engineer Company, 35th Enginer Brigade	Fort Leonard Wood, Missouri

FUELING THE FRONT LINES:
ARMY PIPELINE UNITS - PART II

By Mr. Thomas J. Petty

This is the second of a two-part history of the Army pipeline units. The first part appeared in the October-December 2007 issue of ***Engineer*** *and covered the beginning of the military pipeline system and units, from shortly before World War II through 1945.*

On 15 August 1946, the 697th Petroleum Distribution Company was reactivated and the unit then bounced around the Philippine-Ryukyus Command in the western Pacific until 26 May 1949, when it was again deactivated. No records of its activities for that time have been found.

During the Korean War, the 83d, 388th, and 700th Engineer Pipeline Companies lent their efforts to the fight. Their assignments were familiar—to build and maintain pipelines, tank farms, and distribution facilities.

On 15 November 1954, the 697th again was stood up, designated the 697th Engineer Company (Pipeline), assigned to the 5th Army, and stationed at Fort Leonard Wood, Missouri, where it spent about three years. On 14 February 1957, it moved to Fort Polk, Louisiana, where it participated in Operation Sledgehammer from 24 April to 24 May 1957. That exercise was probably the most important assignment United States Army pipeline companies had during the 1950s and early 1960s. Attached to the 1st Armored Division, the 697th again met the challenge of delivering fuel to combat forces in the field, but this time with a new system for pipeline fuel delivery. The fast deployment of pipeline, quick fuel storage devices, and concealment were emphasized. This would be the most important operation involving the 697th until the unit deployed to Thailand in 1965. The 697th received a meritorious unit commendation for its efforts during Operation Sledgehammer.

With the new system, the pipeline was no longer a rigid steel pipe but a flexible hose similar to a fire hose. Hundreds of feet of hose were folded up tightly in large crates and loaded onto a truck. In a deployment process called "flaking," the loose end of the hose was fastened temporarily to the ground so when the truck pulled away, the hose rapidly unwound from the crate. When one crate of hose was strung out, a coupling crew connected the end to the hose in the next full crate and the truck would drive off again, dispensing the hose out the back as it went. The hose was meant as a temporary pipeline to deliver fuel to the front lines more quickly than, but just as dependably as, the steel pipelines. When not in use, the hose could be repacked and moved to another location. Terrain was easier to navigate with the new system. At streams, the hose was simply strung along the sides of a bridge. Sometimes a log set across the stream was enough to support the hose. In open territory, the hose was laid along the road grade.

The accompanying pump stations, tank farms and manifolds, and fuel-dispensing racks were also much simpler with this system. The pump stations along the line used marine-style engines and pumps, which were smaller and simpler to operate but spaced closer together. The flexible hose was laid out and hooked up to one side of the pump. The next section of line was hooked up to the other side of the pump, and then the truck would drive away, flaking as fast as practicable.

The tank farms were a series of 10,000-gallon blister bags that lay flat on the ground when empty but inflated when filled with liquids. The blister bags shortened the time needed to install a storage unit. First, the ground was leveled and all sharp objects removed, usually by men with rakes. Then the blister bags were pulled from their crates and laid out flat on the ground and connected to the manifold, which controlled the flow of fluids to and from the blister bags.

The system using inflatable blister bags was developed in the 1950s and was still in use during the 2003 invasion of Iraq.

The dispensing racks were simplified also. During Operation Sledgehammer, the 697th completed a filling station for tanker trucks, which in turn was used to fill canisters at points set up along the line. Vehicle fill points could also be set up there, or at any other point, by tapping into the pipeline. Since the 697th was working with the 1st Armored Division, a tank refueling station was also constructed. Another segment of the operation involved building a tank farm with a 10,000-barrel steel storage tank and two smaller tanks, including the conventional pump station and manifolds. Three other tank farms using blister bags and flexible pipeline were also built. To add to this mix, it was decided to try camouflaging the different systems and the company vehicles and men.

This system was also deployed for the current war in Iraq. It was critical that the main pipeline be built into Iraq as quickly as possible, so a flexible hose was used to deliver fuel to a tank farm a few miles from the main line. Although this system was more labor intensive and was unable to deliver the same volume of fuel as a regular coupled pipeline, it kept the tank farm adequately supplied until a regular coupled pipeline could be installed.

After the mid-1950s, there were only three pipeline companies in the Regular Army:

- The 697th Engineer Company (Pipeline) was based at Fort Leonard Wood from December 1954 to February 1957; Fort Polk from February 1957 to April 1959; Fort Hood, Texas, from April 1959 to January 1962; and Fort Wolters, Texas, from January 1962 until it deployed to Thailand in July 1965. It was deactivated in Thailand in August 1969.
- The 515th Engineer Company (Pipeline) was at Fort Belvoir, Virginia, before being attached to the 5th Engineer Battalion at Fort Leonard Wood. It went on to participate in the first Gulf War and then became a Missouri National Guard pipeline unit until it was deactivated in 1995. It has recently been reactivated but as an engineer construction company.
- The 543d Engineer Company (Pipeline) was stationed in France and was deactivated there in 1970.

Pipeline engineers attach redesigned couplings that made laying pipelines much easier.

Soldiers from a pipeline company repair matting that buckled in the extreme desert heat.

Since the early 1990s, the Regular Army has not had a pipeline company.

The 515th developed a reputation for its ability to complete projects in an exemplary manner while at Fort Leonard Wood. The 543d operated, maintained, and oversaw petroleum distribution in five distribution districts in France and parts of Germany. The 697th worked in a "behind the lines" environment in Thailand for four years during the Vietnam War and completed innumerable projects on both company- and platoon-level missions in Thailand, Vietnam, and Korea. This part of the article will again focus on the 697th.

During the 1950s and 1960s, career pipeline noncommissioned officers (NCOs) rotated among the three companies and soon became a "pipeline family." This made for

A crew positions the pipe before installing a gate valve.

a close-knit operation and support system. According to the career NCOs, true pipeline Soldiers need to have served in all three companies. The Soldiers were so close that officers were considered of no consequence unless they were affiliated with pipeline engineering in some form. The first assignment for the 697th Engineer Company (Pipeline) when it arrived in Thailand in 1965 was to build a base camp for itself and the 9th Logistics Command, which was head of all engineering activities in Thailand. The base camp, built at the outskirts of the inland city of Korat, was named Camp USARTHAI—short for "United States Army Thailand." To the chagrin of most of the men there, later camps were given more impressive names, such as Camp Lightning or Camp Essayons.

The first task for the 697th was to build shelters (known as hooches) for Camp USARTHAI and other camps being set up at the time. The 2d Platoon was sent to the Sattihip Cantonment Area to build storage tanks and ship-unloading facilities at the new deepwater port there. The company also evaluated the roads leading to the major camps and air bases in the area and found that they were in dire need of improvement. For the first few months in 1965, the 697th built bases, scouted roads, constructed a helicopter pad and then turned it into a tennis and basketball court, and completed other small construction jobs. In the spring of 1966, the engineers were called on to start a major project: build six 10,000-barrel storage tanks at the Royal Thai Air Force Base (Camp Friendship) at Korat.

It was a job for the entire company and the first of a series of assignments to challenge the company's mettle. The tank farm was already large by the usual standards, but the air base was expanding rapidly to keep pace with the war in Vietnam. The 561st Engineer Battalion cleared the jungle and set the level grade. Concrete was used for the tank foundations and as one foundation was set and ready, another was being built. The tanks were put up one after another as the foundations were finished. As many as three tanks were in various stages of construction at one time. In three months, despite technical problems with the materials, the tanks were completed and water-tested on schedule.

Building the six tanks was the last company-sized project the 697th performed until July1969, when all the platoons came together at the Sattihip Cantonment Area to work on a new installation—Camp Samae San. The platoons completed many widely scattered projects; the main assignments included the following:

- In mid-1966, 2d Platoon went to Vietnam to build a 52.6-mile pipeline from Anke to Quin Yon.
- In October 1966, 1st and 3d Platoons built a tank farm at the Royal Thai Air Force Base at Nakon Phanom, Thailand.
- In January 1967, 2d Platoon returned from Vietnam and many of its men rotated home, to be replaced with new personnel. Along with 1st Platoon, they built the most elaborate movie theater in Thailand. Although a 697th electrician pointed out a wiring problem during construction, no action was taken. The theater almost burned down the same night it was dedicated.
- In March 1967, 1st Platoon returned from Nakon Phanom and joined 2d Platoon at Camp USARTHAI to build the movie theater. Road construction and repair to the adjoining air base were also on the hot list. Remaining at the Nakon Phanom Royal Thai Air Force Base, 3d Platoon performed an impressive list of tasks, including construction of three 10,000-barrel storage tanks at the farm, two 10,000-barrel storage tanks at the water purification plant, a pump station at the reservoir, and several miles of 8-inch pipeline to the base water purification plant to the south, a 4-inch water pipeline to

the tank farm from the water plant, and the start of the tank farm manifold system.

- In September 1967, the platoons changed places and 2d Platoon went to Nakon Phanom Royal Thai Air Force Base to build two more 10,000-barrel fuel storage tanks in the tank farm and complete the tank farm manifold. Meanwhile, 3d Platoon went back to Camp USARTHAI for much-needed equipment repair and to continue area construction projects, and 1st Platoon convoyed to the Sattihip Cantonment Area to build two 10,000-barrel storage tanks for the water system and begin installing water lines to the new camp. This was the start of a two-year project building Camp Samae San, which ended up with the entire company present and working on it in July 1969.
- For the four years that the 697th was in Thailand, the motor pool personnel had worked hard under less-than-perfect conditions. The mechanics did an outstanding job of supporting the line platoons, and never was there a breakdown or need for emergency road service on any of the company's vehicles.
- In March 1968, the 697th was alerted that it would be assigned to a project in Korea. All the company's experienced Soldiers with more than 90 days to rotation were put into 3d Platoon to bring it up to full strength, except for a small contingent of experienced Soldiers left behind in 1st Platoon. This platoon would be based in Camp USARTHAI to perform tank farm maintenance throughout Thailand for the following year.
- After losing most of its experienced Soldiers to 3d Platoon, 2d Platoon was sent to the Sattihip Cantonment Area in March 1968 to install more water lines.

Building the Sattihip Cantonment Area was probably the 697th's largest and most time-consuming project. Delta Company, 538th Engineer Battalion, arrived at the site in May 1967 and built hooches and a water pipeline from nearby Utapoe Air Base. The 697th sent 1st Platoon there in September 1967 to build two 10,000-barrel storage tanks for the water system. The tanks were high on the side of a very large hill and would supply adequate pressure to the camp below, acting as a water tower. For two years the 697th worked, often in deplorable conditions, to complete the camp water and sewer systems.

While 2d and 3d Platoons worked at Camp Samae San, 1st Platoon had been doing repair work at the major air base tank farms and petroleum, oil, and lubrication (POL) facilities around Thailand for almost a year. From February to July 1969, 1st Platoon sealed and tested four 10,000-barrel tanks and refurbished the manifold system in the tank farm at Udorn Royal Thai Air Force Base. The platoon installed 1,200 feet of welded steel pipe and another 2,500 feet of coupled pipe. For their hard work and ability to do the job without shutting down the base tank farm, the platoon was awarded a unit commendation by United States Air Force officials, who do not lightly give out awards to Army units. At the end of this assignment, 1st Platoon also went to the Sattihip Cantonment Area.

In August 1969, the 697th Engineer Company (Pipeline) was deactivated. The following quote is from an e-mail by Captain Joe Wagda, the last company commander:

> *By the way, at the time, we were told that the 697th was the first unit in the Vietnam theater to be deactivated, so we were to be the model for other units that followed. It was amazing to go through the deactivation process while concurrently working our projects right until the deactivation date when we transferred responsibilities over to the 538th. Quite a performance!*

Quite a performance indeed!

But this is not the end of the pipeline story. The wars in Iraq and Afghanistan marked another time and another need for fuel to be delivered to the front lines. Some of the needs of World War II are the same in the new conflicts. The Abrams M1 tank is considered to be one of the world's best, but it guzzles fuel. According to an article in the July-September 2003 issue of *Engineer*, "The pipeline was essential, as one of the Combined Forces Land Component Command's prestart

At crossing sites, the pipeline is buried deep enough that the weight of passing vehicles won't affect it.

conditions for the war with Iraq was the completion of the [inland petroleum distribution system] to Breach Point West on the Kuwait-Iraq border."[1] Fuel delivery was now seen as a prerequisite rather than a secondary consideration of war. What was learned in previous wars was now applied once again. Long expansions of the pipeline, the location of pump stations, staggered workloads, and the relocation of the pipeline unit's headquarters at intervals along the route were still the same. Packaging, advances in delivering materials, and the use of skid loaders and other labor-saving machines increased productivity tremendously.

The most important mechanical improvements in the pipeline system were the use of aluminum to make the pipeline tubes lighter and easier to handle and the redesign of the Victaulic coupler. The coupler is now hinged and pressed over the pipe tube with a special tool and then "pinned" into place rather than bolted. This improvement saves time during both installation and repair.

The use of several companies to construct and test the lines was incorporated to a higher degree than before. Regular combat engineer companies built the pipeline while Reserve pipeline companies did the follow-up line testing, repair, and pump station construction. Several hundred miles of pipeline were constructed and delivered enormous amounts of fuel to frontline vehicles. The 62d Engineer Battalion (Combat)(Heavy), 226th Engineer Company (Combat)(Heavy), and the 808th Engineer Company (Pipeline) (a United States Army Reserve unit) helped complete this project. Before the Abrams M1 tanks even rolled, the pipeline was planned, laid out, and operating right up to the border of Iraq. This may very well be the face of pipeline construction in the future, with Active Army engineer units doing the bulk of the work and specialized Army Reserve and National Guard pipeline units lending their expertise where needed.

Essayons! Pipeline rules!

Mr. Petty was a farm boy from Iowa when he enlisted in the Army in 1966. He spent his Army career in pipeline companies. After leaving the Army, he graduated magna cum laude from a community college that offered a farm equipment mechanic's course. He has been a mechanic for 34 years and is still very interested in the pipeline experience. For more information about pipeline unit history, contact him at <tom697th@gmail.com>.

Endnote

[1] Captain Anthony De Simone and Major Normand Gauthier, "The Inland Petroleum Distribution System in Kuwait and Iraq," *Engineer*, July-September 2003, pp. 13-18.

·········· The Engineer Writer's Guide ··········

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

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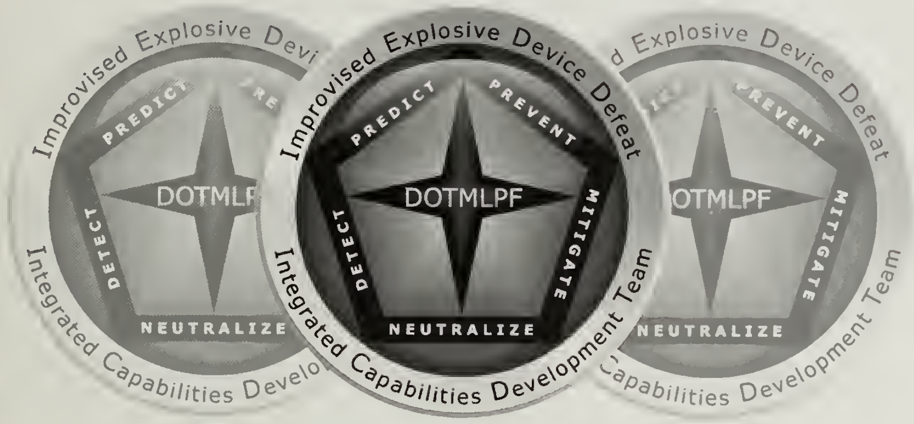
Send submissions by e-mail to <*leon.engineer@conus.army.mil*> or on a 3 1/2-inch disk or CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication by other Army professional bulletins.

IMPROVISED EXPLOSIVE DEVICE DEFEAT CAPABILITY INTEGRATION TEAM

By Mr. John Moore

The Army has established a Capability Integration Team (CIT) to specifically assist active and reserve deploying units with improvised explosive device defeat (IEDD) training and materiel capabilities integration. The CIT was established as a result of gaps identified in the Army IEDD training strategy published in March 2007. The CIT serves all units as a point of contact for IEDD questions and issues. In June 2007, the Army Assistant Chief of Staff, Operations and Plans, approved and funded six CIT locations: Fort Lewis, Washington; Fort Bliss, Texas; Fort Hood, Texas; Camp Shelby, Mississippi; Fort Bragg, North Carolina; and Fort Leonard Wood, Missouri. Teams at each location are capable of traveling to other nearby Army unit locations or other Service bases to assist units with their IEDD requirements. Priorities of work are driven by the Army Force Generation (ARFORGEN) process and the deployment and training priorities established by the U.S. Central Command and the U.S. Army Forces Command. For further information regarding the CIT, contact <*leon.cdidieddicdt@conus.army.mil*>.


Improvised Explosive Device Defeat
PREDICT
PREVENT
DOTMLPF
DETECT
MITIGATE
NEUTRALIZE
Integrated Capabilities Development Team

IMPROVISED EXPLOSIVE DEVICE DEFEAT TRAINING WEBSITE

The U.S. Army Training and Doctrine Command Improvised Explosive Device Defeat (IEDD) Integrated Capabilities Development Team (ICDT) has established an IEDD training website as a result of an initiative contained in the Fiscal Year 2007 IEDD Training Strategy. The site was established in close coordination with personnel responsible for operating the Center for Army Lessons Learned, the Battle Command Knowledge System, and the U.S. Joint Forces Command Knowledge and Information Fusion Exchange (KnIFE) sites. The IEDD training website encompasses the self-development, operational, and institutional training domains. Additionally, it provides training support products to remote locations to assist individuals with their current jobs and prepare them for future assignments with increased responsibility. The site further serves as a portal for access to other Army IEDD training resources that have been developed by various Army proponents. The uniform resource locator (URL) for the IEDD training website is <*https://www.us.army.mil/suite/page/477426*>. An Army Knowledge Online (AKO) account is required to access the site.

Mr. Moore is the Senior Training Development Analyst, TRADOC Improvised Explosive Device Defeat (IEDD) Integrated Capabilities Development Team (ICDT), Fort Leonard Wood, Missouri.

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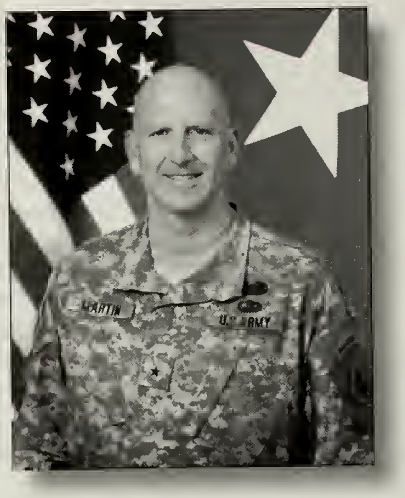
Clear The Way

By Brigadier General Gregg F. Martin
Commandant, United States Army Engineer School



Teammates: Greetings from Fort Leonard Wood, the home of our magnificent Army Engineer Regiment! While our Regiment is decisively engaged in simultaneous full spectrum operations across the globe, we have embarked on a significant journey into the human dimension, which will have far-reaching, enduring, and strategic effects on our Regiment and Army. Launching this journey was the principle focus of ENFORCE 2008, which we recently held from 4-9 May in St. Louis and at Fort Leonard Wood.

As in the past, the purpose of ENFORCE was to—

- Build the future of our Regiment.
- Enhance learning and professional development.
- Promote fellowship and esprit de corps.
- Celebrate our achievements, traditions, and history.
- Connect senior leaders, junior leaders, alumni, and Family into the regimental "circle of life."

On top of all the learning and hard intellectual work, we had a great time of celebration, fellowship, competition, and remembrance. Highlights included—

- World-Class Speakers, who stretched our brains, challenged our conventional thinking, and informed us.
- Interaction with our world-class Industry Partners, who support and enable us with materiel and technology solutions and support.
- Breakout Sessions with key leaders from around the world who came back to inform and educate us on the Stability Operations they are currently engaged in and responsible for.
- Regimental Spirit Run, with plenty of pushups and flutter kicks.
- Best Sapper Competition and awards (see article, page 31).
- Commandant's Reception and Mega-Mixer, which pulled together senior leaders, junior leaders, alumni, and Family in a wonderful social event.
- Tours of the world-class Counter Explosive Hazards Center and Military Construction (MILCON) Projects.
- Chief of Engineers State of the Regiment Address (see article, page 6).
- Prayer Breakfast in the World War II chapel.
- Remembrance Service, in honor of the 37 heroic fallen Sappers who made the ultimate sacrifice since the last Roll Call a year ago (see article, page 26).
- Regimental Ball, a "Circle of Life" event, at which we presented the Regimental Awards for Excellence: Itschner Awards, Sturgis Medals, Best Platoon Leader Awards, and Van Autreve Award (see article on page 27 for detailed recognition of these Soldiers and units), as well as the Gold DeFleury Medal to LTG (Ret) Robert Flowers, and the Essayons Award to his wife Lynda.
- Spouse Program, consisting of a diverse array of important, interesting, and enjoyable events throughout the week.

Of special note was the Regimental Change of Responsibility between CSM Clint Pearson and CSM Robert Wells (see article, page 5). We thank CSM Pearson and Mollie for their four-plus years of dedicated service to our Regiment in this key leadership role. We wish them all the best as they are reassigned to Washington, DC, where they will continue to do important work for our Army. And we welcome CSM Wells and Ann—the perfect team to help lead our Regiment into the future and to the next level.

Thanks to everyone who came to ENFORCE 2008 and participated, and to everyone who played a role in planning, supporting, orchestrating, and executing this outstanding and successful event. Please get the word out and take the message of Building Great Engineers to the streets!!!

For those of you who could not attend, I ask you to read the forthcoming reports, get engaged in the Campaign Plan, and help us Build Great Engineers for full spectrum operations in an era of persistent conflict.

For all of you who are deployed around the world, performing full spectrum operations on behalf of our great nation—THANK YOU! You are doing incredible work of tremendous importance and are making an enormous positive difference! Keep at it, keep the faith, stay safe and healthy, and know that you are in our thoughts and prayers. You have the complete and total support of the entire Regiment!

May the Good Lord bless each of you and your Families! All the best!

ESSAYONS!!! Army Strong!!!

Mark your calendars now for ENFORCE 2009, the week of 19-25 April 2009, at our Regimental Home – Fort Leonard Wood!!!

Lead The Way

By Command Sergeant Major Robert J. Wells
United States Army Engineer School

I'd like to take this opportunity to thank all the great Soldiers, past and present, who have helped me get to where I am today. Working and fighting alongside our brothers in maneuver, fires, intel, and sustainment units has given me an appreciation of the challenges we face on today's battlefield and emphasized the importance of the engineer role.

My focus has always been on the mission, the Soldier, and the commander. As a noncommissioned officer (NCO), I believe we're the conduit that turns the commander's vision into reality. Mission command is more than just a doctrinal term you spout when nothing else comes to mind. No commander can be everywhere on the battlefield at all times. But wherever you find Soldiers, you're sure to find an NCO, and the commander has placed his trust and confidence in us and the junior officers to execute the missions within his intent. There are no better Soldiers on the battlefield, who know how to execute the wide variety of tasks required in a counterinsurgency (COIN), than today's young NCOs and officers. I have devoted myself to doing everything in my power to make them successful.

There are certain skills (beyond the basic combat skills) in which every Soldier should be proficient in today's COIN environment, regardless of their rank, branch, or expertise. Those skill sets are—

- Negotiations
- Cultural Understanding
- Language
- Counter-IED, Counter-Sniper
- Economy of Force (EOF), Rules of Engagement (ROE)
- Search, Detain, Prosecute
- Tactical Questioning
- Every Soldier a Sensor and Ambassador

We've been at this fight for almost seven years, yet our Soldiers are still having a hard time using the Army's basic commands in Arabic, Dari, or Pashtun. The Iraqi Security Force (ISF) and Afghan National Security Force (ANSF) are taking the lead more and more each day. Our interaction with them and the civilian population grows exponentially just before we hand off each traffic control point (TCP), joint security station (JSS), or police station to the ISF/ANSF.

The lieutenant isn't the only Soldier in the platoon that uses the interpreter. Building a good rapport with your "terp" and setting down some ground rules for negotiations or key leader engagements are always good practices. I believe there are some baseline standards to operating on the battlefield. Everyone in the patrol should know their part in the 5, 25, and 200 Drill. Standing on the shoulder of the road (where the IEDs are normally placed) and waiting for your sergeant to tell you where to go is not a healthy practice. Counter-sniper drills must be well thought out and rehearsed inside the combat outpost (COP). I can tell you that "SniperBoy" doesn't like us to be alongside or behind him, nor does he like us to use available cover.

When in doubt, don't shoot. You don't want an Iraqi or Afghan father to walk up to your platoon leader or platoon sergeant and say, "You killed my son." Positive identification (PID) is just that, and quickly recognizing a threat is another drill that can be taught while we're back in the rear training for the next deployment.

Identify the "bully" in the platoon after a catastrophic event. He's the one who can't wait to get back outside the wire and indiscriminately make things right. Finding the right bad guy is usually a long and tedious intel-driven process, but well worth the effort. It'll prevent the creation of new enemies and will bring the civilian population over to our side.

To be a good sensor, a Soldier must recognize normal activity. We can start by using a long-practiced Cavalry Scout technique of maintaining a journal. We should document who lives across the road from our COP, what vehicles they use to travel, daily habits and routines, vehicle or dismounted traffic. It'll build a great picture for the Soldier of what normal activity looks like, and then those odd vehicles, people, or events will stand out from the daily routine. We're under observation as soon as we leave the wire, why not them?

Proficiency in these skills is as important as our technical expertise. These competencies get us from the COP/forward operations base (FOB)/JSS to the objective and carry us through the completion of our mission.

With the large turnover of Soldiers after a deployment, and the buildup of the formation for the next deployment, a lot of hard lessons are lost. We can set our units up for success if we solidify the unit tactical standing operating procedures (TACSOP) before R+90 and the team PCSs to the four winds. At least the new guys will know what right looks like. They can take it from there.

It's a great time to be a Soldier, and especially an engineer. "Praise the Lord, now pass the bullets."

Lead The Way

By Command Sergeant Major Clinton J. Pearson
United States Army Engineer School

Greetings Sappers! I hope and pray that all has been well with our Soldiers, Families, and Civilians who have given so much to our Regiment, our Army, and our nation. This is my final article as your Regimental Command Sergeant Major. I am extremely grateful for your support, sacrifices, and accomplishments.

I am truly blessed for the opportunity to serve our nation and Regiment while our military is at war. Everything we have done makes me proud to be an American—proud to live in a nation that is obliging for good in the world and values human life; where we "hold these truths to be self-evident: that all men are created equal, and that they are endowed by their creator with certain unalienable rights, that among these are life, liberty, and the pursuit of happiness." I'm so thankful that we have men and women who are willing to answer the call to protect our way of life; many have paid the ultimate sacrifice for the liberty and freedom we enjoy every day. These God-gifted men and women are willing to step out of America's sandbox to help give liberty and freedom to oppressed people in other nations. Today, we continue to stand on the shoulders of these giants, continuing our efforts to provide peace and stability around the world. I will forever keep each of you in my daily thoughts and prayers. To the Families that have lost loved ones in past or present conflicts, you will remain our nation's greatest treasures.

I would like to highlight a few of the many accomplishments we have made over the past four and a half years that fall into the T3 areas of *Taking Care*, *Transforming*, and *Training*. Let's first address *Taking Care*, specifically regarding engineer senior enlisted promotions. I am proud of our Regiment in this area because we set many records, especially during the most recent E7-E9 promotion boards. Here are some statistics:

- 51 master sergeants were selected for sergeant major (the largest E9 selection rate engineers have had in decades).
- 191 sergeants first class were selected for master sergeant.
- 352 staff sergeants were selected for sergeant first class.

We also set records regarding *Transforming* and *Training*. Our Army has undergone the most rigorous transformation in history, while engaged in the War on Terrorism. Our Regiment has also undergone a significant transformation from IET, AIT, EOBC, NCOES, to the structure of battalions, brigades, companies, sections, and teams that support the combatant commander to the embedded engineers in the HBCT. We must continue to strive to provide them with the necessary skills and tools to enable the combatant commander to ensure mobility in concert with maneuver.

To assist us in this endeavor, the Engineer School has implemented several functional courses that provide our Soldiers and leaders with the skills and tools that have proven to be force multipliers, including the following:

- Combat Search Operations Course
- Route Reconnaissance/Clearance Operations Course (R2C2)
- Route Reconnaissance/Clearance Operations Course – Sapper (R2C2-S)
- Route Reconnaissance/Clearance Operations – Maintainer (R2C2-M) Course
- Area Clearance Course
- Improvised Explosive Device Defeat – Train the Trainer (IEDD-T3) Course
- Dog Detachments/SSD
- Improvised Explosive Device Defeat – Train the Trainer (IEDD-T3) Mobile Training Team (MTT) Course.

Two other important courses are the joint Urban Mobility Breaching Course (UMBC) at Camp Lejeune, North Carolina, which has greatly improved the Sappers' ability to fight and win in an urban environment; and the Explosive Ordnance Clearance Agent (EOCA) Course at Fort Leonard Wood, which provides basic skills and knowledge required to perform as EOCA. All these courses are relevant to the current and future fight and provide our Soldiers with the tools and skill sets needed to succeed.

Regarding NCOES, we realize that we cannot completely give up our technical skills for combat skills. Therefore, we are currently relooking the NCO technical competency skill sets. In the meantime, however, I ask the leadership to continue to allow NCOs to attend the Basic Noncommissioned Officer Course (BNCOC) and the Advanced Noncommissioned Officer Course (ANCOC). Both are extremely important to the career progression of NCOs and greatly enhance their ability to perform their wartime mission.

I also ask you to continue to support another area that is near and dear to my heart—the Engineer Regiment's annual Best Sapper Competition. This event was created three years ago and grows stronger every year. We continue to see more and more participants and obtain more and more support. It is an amazing and inspiring competition that shows our engineers knee-deep in action!

In closing, I'd like to welcome back those Soldiers who have recently returned from a deployment. And to those who have recently departed, I wish a safe and speedy return home. God bless you and the fallen comrades and their Families. We will never forget you. Finally, I again would like to thank each of you for your support, dedication, selfless service, professionalism, tremendous efforts, and inspiration during the past four and a half years. It has been an amazing once-in-a-lifetime opportunity to serve as your Engineer Regimental Command Sergeant Major. I salute each of you and wish you Godspeed. Essayons!!! Sapper Strong!!! Army Strong!!!

REGIMENTAL CHANGE OF RESPONSIBILITY

On 8 May, the spotlight of ENFORCE 2008 was on the Regimental Change of Responsibility ceremony, not only to celebrate the great event and the great people involved but also to highlight the crucial role and responsibility of our senior noncommissioned officers (NCOs).

Command Sergeant Major (CSM) Clinton J. Pearson and his wife Mollie were honored and thanked for their service to our Regiment in this key leadership role, and the saber was passed to CSM Robert J. Wells and his wife Ann, as they assumed responsibility.

Outgoing Regimental CSM Clinton Pearson, Engineer School Commandant BG Gregg Martin, and new Regimental CSM Robert Wells

CSM Wells has a remarkable background—highly decorated with two combat tours; Airborne, Ranger, Air Assault, and Sapper; Drill Sergeant; Exchange NCO with the Australian Army; and he has excelled in every leadership position from squad leader to CSM. A great engineer, he has distinguished himself most recently as a combined arms, full spectrum warrior as CSM of the 1st Brigade Combat Team (BCT), 4th Infantry Division, in Iraq and CSM of the Operations Group at the National Training Center, Fort Irwin, California. CSM Wells is clearly the right person in the right seat of our Regimental Bus, as we make the journey to Building Great Engineers for full spectrum operations in an era of persistent conflict.

CSM Wells entered the military at Columbus, Ohio, on 15 January 1980. After basic and advanced individual training (AIT), he completed airborne training with the 43d Airborne Company and was then assigned to the 82d Airborne Division, with primary duties as an M60 machine gunner. In 1984, he was assigned to the 5th Infantry Division at Fort Polk, Louisiana, as a combat engineer squad leader. He was promoted to staff sergeant (SSG) and was a platoon sergeant until his reenlistment to the Federal Republic of Germany and the 130th Engineer Brigade in 1986. There, he was a squad leader with Alpha Company, 317th Engineer Battalion, until his selection for drill sergeant duties at Fort Leonard Wood, Missouri, in 1989. While serving two years on "the trail," he was promoted to sergeant first class (SFC) and worked briefly at the Drill Sergeant School, until his reassignment to the 65th Engineer Battalion at Schofield Barracks, Hawaii, in 1992. While at Schofield Barracks, he was a platoon sergeant with Alpha Company, battalion operations sergeant, and first sergeant (1SG) for Bravo Company, 65th Engineer Battalion.

In 1996, he was transferred to the 101st Airborne Division at Fort Campbell, Kentucky, where he was 1SG for Headquarters and Headquarters Company, then Bravo Company, 326th Engineer Battalion, until 1999. He was then selected to be the Regiment's Combat Engineer Exchange NCO, with duties in Sydney, Australia. While in Australia, he was promoted to sergeant major (SGM) and was transferred to Canungra, Queensland, to teach at Australia's Regional Training Center.

In 2001, he was promoted to CSM and assigned to the 4th Infantry Division and the 299th Engineer Battalion at Fort Hood, Texas, where he deployed with the 299th to Operation Iraqi Freedom I, Tikrit, Iraq. The 299th took part as the screening element on Operation Red Dawn that resulted in the capture of Saddam Hussein on 13 December 2003. Upon redeployment from Iraq, he was selected to be CSM of the 1st Brigade, 4th Infantry Division, and helped the brigade transform to the new unit of action and become 1st BCT, 4th Infantry Division. The BCT deployed to Operation Iraqi Freedom 05-07 in December 2005 and operated around Taji, Iraq, until its return to Fort Hood in December 2006. He later became the Operations Group CSM at the National Training Center.

CSM Wells' military schools include all phases of the Noncommissioned Officer Education System (NCOES), Ranger School, Sapper Leader Course, Drill Sergeant School, and Airborne and Air Assault Schools.

He has been awarded the Legion of Merit, Bronze Star (2), the Purple Heart, and the Combat Action Badge and is a recipient of the Engineer Regiment's Bronze de Fleury Medal. He is also a Legionnaire in the Order of Saint Maurice, a Noble Patron of Armor in the Order of Saint George, and a member of the Honorable Order of Saint Barbara.

CSM Wells is married to the former Elizabeth Ann Haywood of Cambridge, Ohio. They have one daughter, Audrey, who lives in California.

State of the Regiment Going From Good to Great

By Ms. Shirley A. Bridges

When Lieutenant General Robert L. Van Antwerp spoke to ENFORCE attendees in 2007, he had been the 52d Chief of Engineers for less than a week, and he focused more on the future of the Regiment than its current state. But when he addressed ENFORCE 2008 attendees on 8 May 2008, he had had a year to assess the Regiment, and he spoke about where he thinks it is now and about some of the opportunities it has to go from good to great.

* * *

"What a privilege it is to be an engineer," he said. "I want to talk to you about our Regiment today. I'm going to give you a sense of where I think we are."

He spoke of a book by Rick Warren called *The Purpose Driven Life,* in which Warren talks about metaphors—particularly a life metaphor. Unlike a simile, which would be *"your life is like. . .,"* a metaphor would be *"your life is...."* Warren suggests that—

- Life is a test.
- Life is a trust.
- Life is a temporary assignment.

LTG Van Antwerp said, "I think that was written for military people." He explained that statement by saying, "We're all going to be *tested*; we're being tested right now as a Regiment like never before." He continued, "There's a certain *trust* that we have that you only give to people in this profession. We're a profession within a profession. The military is a profession, but the Engineer Regiment is a profession within that profession." He said, "Then, there's the *temporary* nature of our assignment. In one sense, the spiritual sense, you won't live forever, and then it will be eternity. And in our case, it's the 20 or more moves we make during our career. But what wonderful things we've seen during those temporary assignments."

LTG Van Antwerp suggested another metaphor for life, and that is that it's a race. Or, more specifically, a relay race. He said that he looks out into the audience and sees all parts of the relay, and he thinks about what his part is. In a relay race, "You start with a baton, and hopefully all your team members are world class. The first runner runs his leg, and there's a stretch on the track where he has to make the handoff. He can't make it before that, and he can't make it after, or he hasn't run the race to win. He'll be disqualified. In a relay race, you have to run the race to win, but you also have to run it within the rules." He added, "Another part that has to happen is that, hopefully, you will finish well on your leg of the race. As you come to the person you have to hand off to, he has to be going at full speed when you make the handoff. That's where you can drop the ball." He said that when he thinks of the youth, and those of us who are older and experienced, we have to be sure we make the handoff.

"Life is a race. Life is a relay race." He said that if you look at the track today, it's a slippery track—a rainy track. And one reason is that there's a lot of competition for resources. He gave a couple of examples:

- By 2015, 40 percent of the world's nations will be water stressed. At some point, there are people who won't have drinking water. There's a lot of tension created by that in the world, and a lot of tension at the fuel pumps. He said he thinks about that for the Regiment. "When we think about fuel efficiency and the vehicles we use, and the armored vehicles that we've never had in these quantities before, what happens when fuel goes to $10 a gallon or $20 a gallon? Can it go there? I don't know, but the track is slippery and wet."
- The cost of food has gone up 45 percent in the last 9 years. There's so much pressure on food stores—because we all want to be energy independent—that some of these stores are being converted to biofuels.

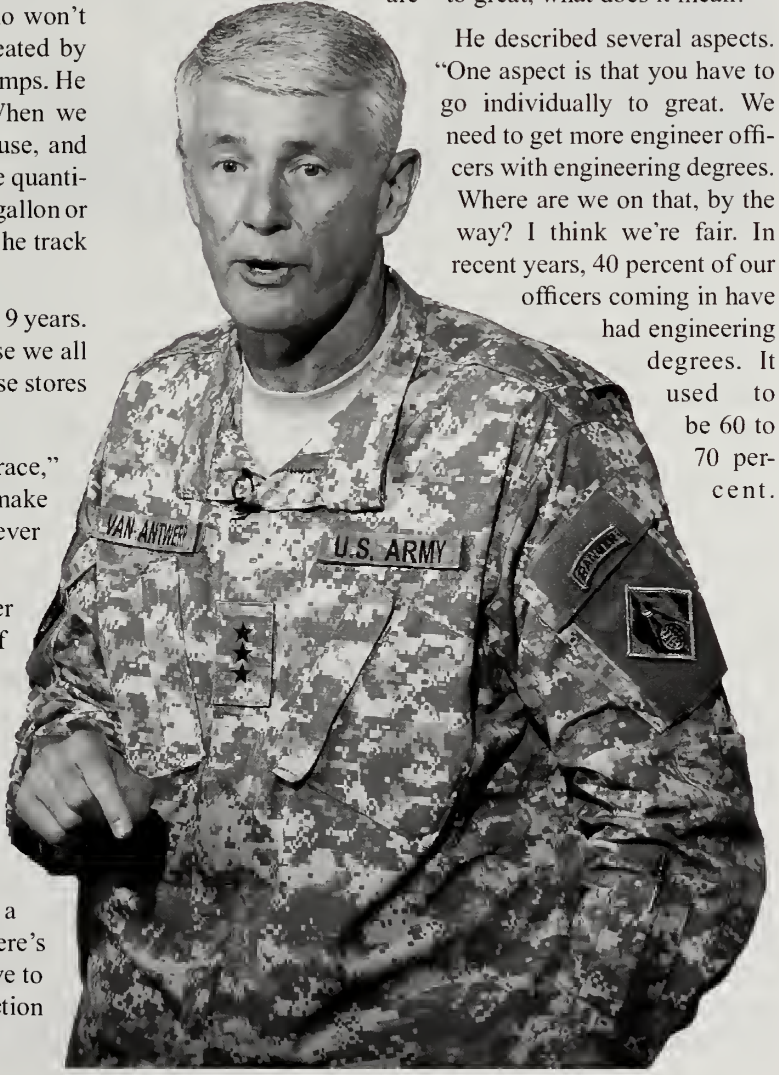
"That's the context in which we're running this race," he said. "But on the other side, there are plusses that make this a special time—a time of opportunity like never before." Some of the opportunities he sees are—

- The Army's budget is greater this year than it has ever been in the history of the U.S. Army. About half of it is supplemental, and the other half is base. The base is twice as big as it was in 1995, but the force is smaller. Because of that, we should make sure that what we have is the best.
- The Army is restationing, and we have one chance to get it right. We also have a lot of changes due to the Base Realignment and Closure (BRAC) Commission—and we have a deadline to be done with that by 2011. There's another deadline in our civil works in that we have to have New Orleans to a 100-year hurricane-protection level by 2011.
- The Army will grow by another 100,000 people. That number includes 10,000 more engineer Soldiers in the next 3 or 4 years. The Chief of Staff of the Army, General George W. Casey Jr., has said that the Army is now at 1 million and that it will grow by another 100,000, and that is it. He has told us to get him the best Army we can within 1.1 million.
- We have some of the best classrooms in the world—not just classrooms in the usual sense, but classrooms called *projects*, where you can go to school and you can build a competency that we've never built before.

"That's the track," he said. "Part of it is slippery and rainy, and part of it is full of opportunities like we may never know again."

"So what do we do about it, and where are we?" he asked. "If we have a scale that goes from *poor – fair – good – very good – great*, where are we now? What do you measure it against? You have to have a measuring stick. You can't just say 'it's fair' or 'it's very good.' We have to have a measuring stick. What does it mean for us to go to great? If we're going to go from where we are—from wherever you think we are—to great, what does it mean?"

He described several aspects. "One aspect is that you have to go individually to great. We need to get more engineer officers with engineering degrees. Where are we on that, by the way? I think we're fair. In recent years, 40 percent of our officers coming in have had engineering degrees. It used to be 60 to 70 percent.



Where would you rank that? We have a team assembled now to try to figure out the right percentage of engineers for the profession."

"You have to go to school," he continued. "It starts here with the Basic Officer Leader Course (BOLC), and it continues your whole lifetime through. You need to get boned up on our profession and take it upon yourself to become personally educated. That's your responsibility. The Engineer School will help, but we're not going to do it for you."

> *"You have to face reality, which is what we're doing now in the Regiment. How do we recruit the force we need for the future?"*

He also said that we can go to great as a unit—a small unit, a squad, a buddy team, and as a Regiment. "It builds," he said, "but it starts with greatness of individuals. So where are we? I would say that right now, the Regiment is good. But I think we have an opportunity to go to great."

LTG Van Antwerp listed four things that he uses as measurements:

You have to deliver superior performance in all you do. He said that this is important whether you're in construction, doing permits, in a sapper squad, or in a unit building a forward operating base (FOB). In military programs, you have to deliver on time—or better yet, ahead of time. And you also need to do it within cost, and get the full scope of the contract. Innovative use of contractors could possibly get up to 15 percent cost savings and 30 percent time savings.

You have to set the standards for your profession. He believes that you'll know when you get there, because people will ask you to tell them what to do. They will steal ideas from you shamelessly and will want to benchmark on you. How do people evaluate us? Do they come to us and say that we set the professional standards? During Katrina, we reached out and tapped the world for answers and found that the Dutch build 10,000-year levees. "But we want people tapping us and saying that we're the experts. I think we're good here, but we can go to great."

You have to do something distinctly (positively) unique for your nation and other nations. He said that a lot of people would say that the Corps is known for something unique in New Orleans, but it wouldn't be in a positive unique sense. We used to build levees in such a way that they only offered 100-year protection, but now they're built like dams, which offer about a 10,000-year protection. And in the Gulf Region Division, we built more than 1,000 schools that held 400,000 students. Not all are occupied, and some don't have teachers. And if the local people don't buy in where we build, and there is no one to watch over the schools, the doors and windows and copper wire will disappear, and we'll have to start over. I give us a very good here, but parts of the handoff need to go to great.

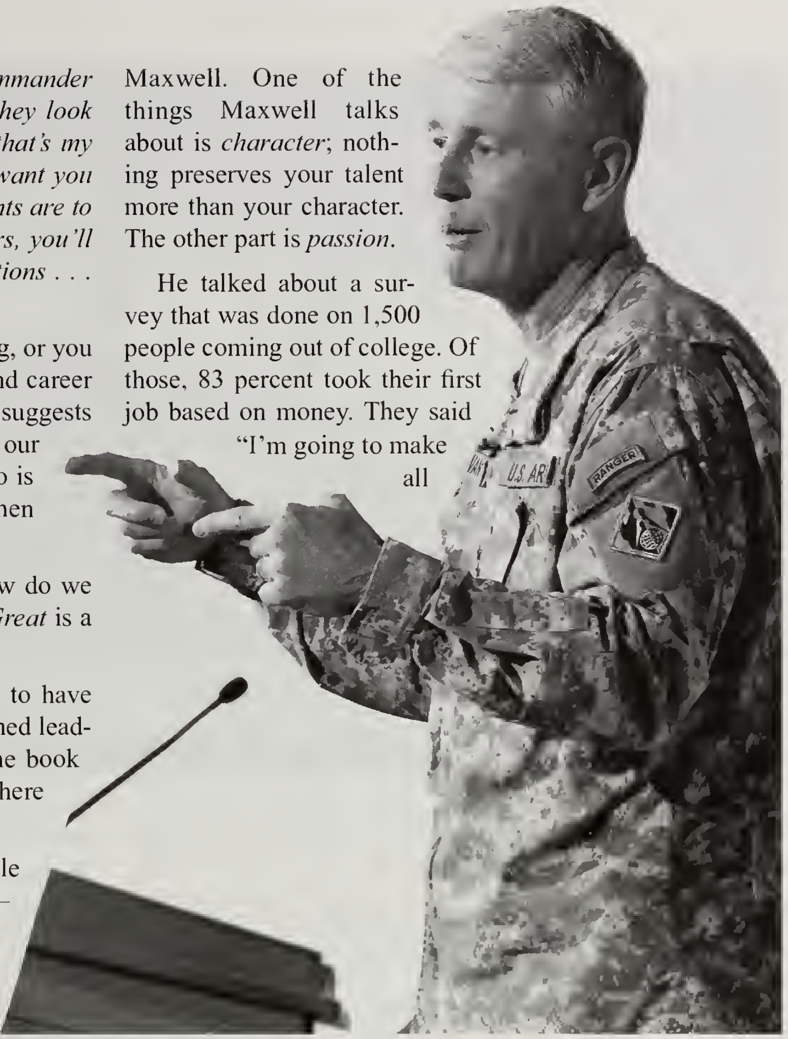
You have to be built to last. "You are built to last when you can look out 10 to15 years and the force is there." So—to use the metaphor of the relay race—you have to have younger people coming on to hand off to.

He mentioned two books that engineers should read for their professional growth, both written by Jim Collins. One of them is *Good to Great*. LTG Van Antwerp said that he knows Collins, and he asked him if he'd ever used an example of a government organization like the Corps in his studies. Collins said, "You go from good to great, and we'll write about it. You start taking notes, and if you get there we'll know it when we see it." The other book is *Built to Last*. "That's where we want to go," said LTG Van Antwerp. "I think we're good, but we have an opportunity to go to great."

He told a story about how in 1995, a new police commissioner took over the New York City Police Department at a time when the city had the highest crime rate of any big city in the country. After assessing what was going on there, the new commissioner put a note on the bulletin board that read, "We're not a team of report takers; we're the police force." With that, he began to change the thinking of the department from "input" to "output." He discovered that 75 percent of all police commissioners got fired because, when their performance was evaluated, the question they were asked was "What happened to the felony crime rate in your place?" Most of those who got fired had been focused on things like how many arrests were made, the number of reports written, and the number of cases closed. LTG Van Antwerp said that the commissioner did something that you're going to have to do if you're going to go to great. He put an audacious goal on the New York City Police Department: He said that he expected to have a double-digit decrease in felonies. So he developed a plan, and they made it—and he's still there.

LTG Van Antwerp said that we need to think "What would be the output so that we'd know we were delivering superior performance? We have a lot of missions to deliver. So what is the output, and how do we know if we're great or not?"

He described the following scenario: *The strategy for brigade combat teams (BCTs) now is to go in and build small patrol bases or small forward operating bases (FOBs). But that hasn't always been the case. With the old strategy, we tried to gather human intelligence (HUMINT) from the Iraqis as we patrolled during the day. But they wouldn't tell us anything because they knew that we would be going back to our FOBs at night, and they'd be left there. They knew that they were being watched to see who they talked to. The new strategy is to get out in patrol bases or small FOBs right in the middle of the main streets, and at night we stay there.*



So if you're a young captain, and the BCT commander says, "You see these five buildings here? I know they look decrepit, and they're not what we're used to. But that's my BCT headquarters, captain. You're my engineer. I want you to figure out what the electric generating requirements are to run that. We have to have lights, we'll want showers, you'll need to provide security and lay in the communications . . . I want to have the whole geospatial picture here."

"What if you as a captain didn't study engineering, or you didn't learn how to do these things in your basic and career courses? You are in a professional dilemma." He suggests that the way to get the experience and knowledge in our people so they can do what we're asking them to do is to first make sure that they're in the right job and then train and educate them.

So what is the framework to get all of this? How do we do it? He suggests that the framework in *Good to Great* is a good one to use.

You have to have disciplined people. You have to have disciplined personnel, and you have to have disciplined leaders. And what do these leaders need to be like? The book shows a chart with leaders at Levels 1 through 5. There are two compelling traits of Level 5 leaders:

– *Be personally humble.* One definition of humble is "when your competency is properly placed"—God first, and then other people (your leaders). Another definition is that you don't need to think less about yourself, but think about yourself less.

– *Have a professional will or ambition for the business (not for yourself).* You have to resolve to do whatever is necessary to make the company great. You have to get your people in the right seat of the bus, after first making sure they're on the right bus. Don't hire someone if you're not convinced that that person is the right one for the job. And if you think you need to make personnel changes, do it now. You have to do that to go to great. In addition, if you have a problem in your organization, don't put your best people there. Put them on your biggest opportunities.

You have to put disciplined thought into it.

– *Determine your "Hedgehog Concept."* This involves focusing your efforts on what you do best. "You can't do a million things and do them well, so focus your actions along your mission."

– *Confront the brutal facts.* "You have to face reality, which is what we're doing now in the Regiment. How do we recruit the force we need for the future?"

You have to have disciplined action. You have to have self-disciplined people to have disciplined action. They must be able to stay focused on the mission and not be swayed by deterrents.

Another book that LTG Van Antwerp recommended for engineers to read is *Talent Is Never Enough* by John Maxwell. One of the things Maxwell talks about is *character*; nothing preserves your talent more than your character. The other part is *passion*.

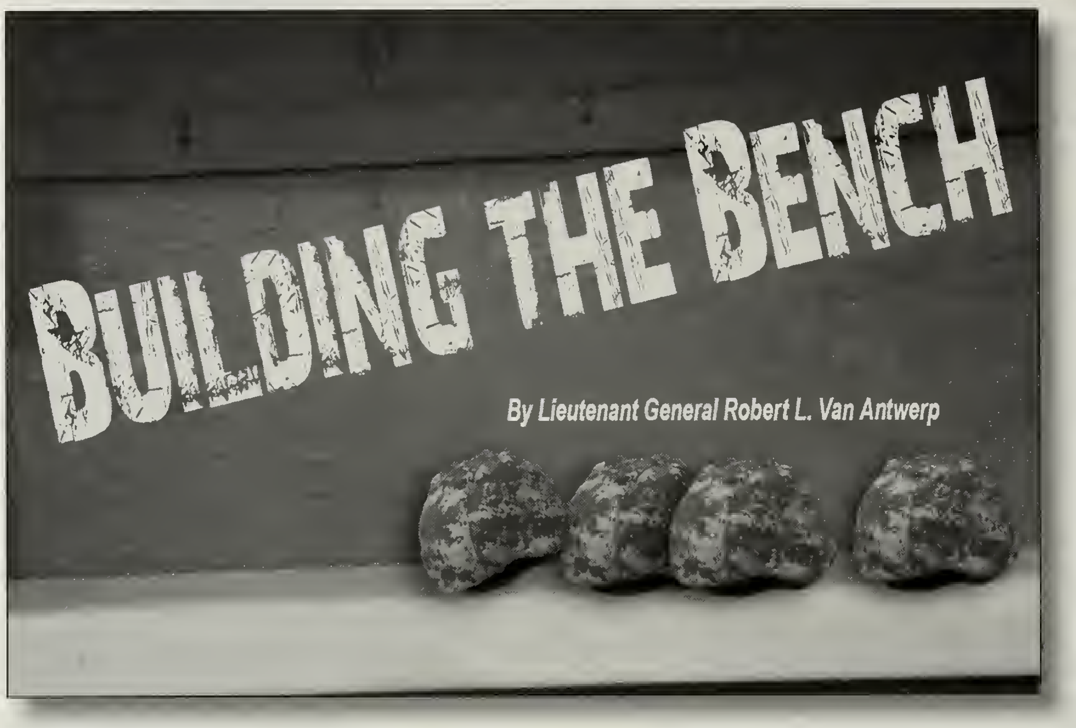
He talked about a survey that was done on 1,500 people coming out of college. Of those, 83 percent took their first job based on money. They said "I'm going to make all the money I need, and then I'll go do what I really love to do." The other 17 percent said, "I'm going to take that first job and do what I'm passionate about, what I love to do, and I'll let the chips fall where they may." They tracked the group to see how many millionaires there were after 20 years, and they determined that there were 101 millionaires out of the group of 1,500. Of those 101 millionaires, 100 were from the 17 percent group—the passionate group.

"If you don't have passion," he said, "you need to find another seat on the bus."

LTG Van Antwerp ended his address with "I say to you as a young person—or as an older person. I am passionate. I love what I do. I love what we do. And we have such an opportunity like never before. We can build our competency so we can go to great. But you have to have passion. If you don't, we need to find a different seat for you. As a Regiment, we're good, but we have an opportunity to go to great."

"Thank you all for all you do. Sappers lead the way. God bless you, this Regiment, and God bless America."

Ms. Bridges is the managing editor of the Engineer Professional Bulletin. She has been a member of the bulletin staff for the past 13 years, either as editor or managing editor.



BUILDING THE BENCH

By Lieutenant General Robert L. Van Antwerp

When do you transform the Army? When you are at war and have the resources and real-world classrooms to test things.

When do you build the bench and needed competencies in the Engineer Regiment? When you have the largest workload since World War II (maybe in our history) and the resources and real-world classrooms to train the next generation and test things.

To move from good to great (delivering superior performance in all missions; setting the standards for our profession; having a unique, positive impact on our nation and other nations; and building a Regiment to last), we need Level 5 leaders[1] (those who put the organization's success above their personal success) and the right people, disciplined people, on the Regiment's bus and in the right seat on the bus.

We need to be "Army Strong" at all levels, from entry level to the most experienced, with a good balance of diversity—age, ethnicity, gender, and education. We need leaders in their field, certified as professional engineers and project management professionals, and licensed to professionally practice their craft.

Here is the context in which we work:

- Largest workload.
- Aging infrastructure.
- Aging workforce, with thousands of baby boomers eligible to retire in the coming years.
- A shortage of college graduates with degrees in science, technology, engineering, and math.
- Other countries, such as China and India, are graduating *three to five* times as many engineers per capita as we are in the United States.

Many of you have heard me talk about the walnuts and rice jar, walnuts being the big priorities.[2] Well, improving our technical competency is a walnut. Our increased workload gives us a limited window of time—three to four years—to turn the trends around and build the force. See *Built to Last*, another book by Jim Collins.[3]

We have already begun a number of initiatives. We recently held a National Technical Competency Workshop at Headquarters, USACE, in which representatives from academia, private industry, contract partners, customers, and professional societies, as well as teammates from each division and senior leaders from headquarters, tackled the major challenges we face on this issue. It was also the focus at this year's ENFORCE at Fort Leonard Wood, Missouri, in May.

Some of the initiatives we're considering address training and equipping our current workforce; recruiting at the national, regional, and local levels; and motivating students to study math and science.

Regarding the current workforce, we want to ensure that the Regiment's employees are challenged and growing the skills they have by giving them the right amount of technical work. We also want to help our teammates achieve the technical certification in their career field. We'll be considering a "beefed-up" training-with-industry program and looking for opportunities to bring the trainers into the Regiment. That may include more frequent use of virtual training programs, where appropriate.

We could use a more structured mentoring plan to make sure our employees are getting the guidance, support, and training they need throughout their career life cycle. I hope to foster an environment where the staff is part of a lifetime of learning and teaching. And we need to be diligent with exit interviews—when our teammates leave the organization, gather that anecdotal information about how to better retain our quality staff members.

Looking to the future, we have to become the employer of choice for new graduates, or even for established professionals who are looking for that midterm career change. We have

(continued on page 19)

ENFORCE 2008— BUILDING GREAT ENGINEERS

By Brigadier General Gregg F. Martin

For ENFORCE 2008, we chose to focus on the human dimension because, in the words of our Chief of Engineers, Lieutenant General Robert L. Van Antwerp, "It's ALL about PEOPLE!" Soldiers, noncommissioned officers (NCOs), warrant officers, officers, civilians, and Families—they are the heart, soul, brains, and essence of all that we are and do as a Regiment, and they are what unites the entire Regiment into the incredible team that we are.

Since 9/11, the Regiment has played an increasingly critical role for our Army, joint force, and nation, as we operate across the full spectrum of operations around the globe. From the tactical to strategic levels, and from environments ranging from stable peace to war, engineers have been crucial. One of the key observations and lessons learned during this period is that full spectrum operations have driven up the requirements for engineer effects and have revealed a capability gap in terms of engineer force structure, organizations, and individual technical competency. While we continue to build the modular engineer force and work to improve force structure deficiencies, we chose to focus on the people part of Building Great Engineers at ENFORCE, because people are by far the most important element; and investment in people also offers the greatest long-term payoff for our Regiment and Army.

So what kind of people do we want, and for what purpose?

The Regiment needs people of great character and values, who are fit, tough, smart, innovative, and adaptive and who are energetic, passionate, and committed to the cause. These people will be charged to plan, orchestrate, and execute full spectrum engineering operations, which range from tip-of-the-spear sapper and combat engineering, to general and geospatial engineering, to massive reconstruction of entire nations (such as Iraq and Afghanistan) and parts of our own (such as the Gulf Coast), and a wide range of diverse engineer missions and requirements in between and across the spectrum of operations (see Figure 1).

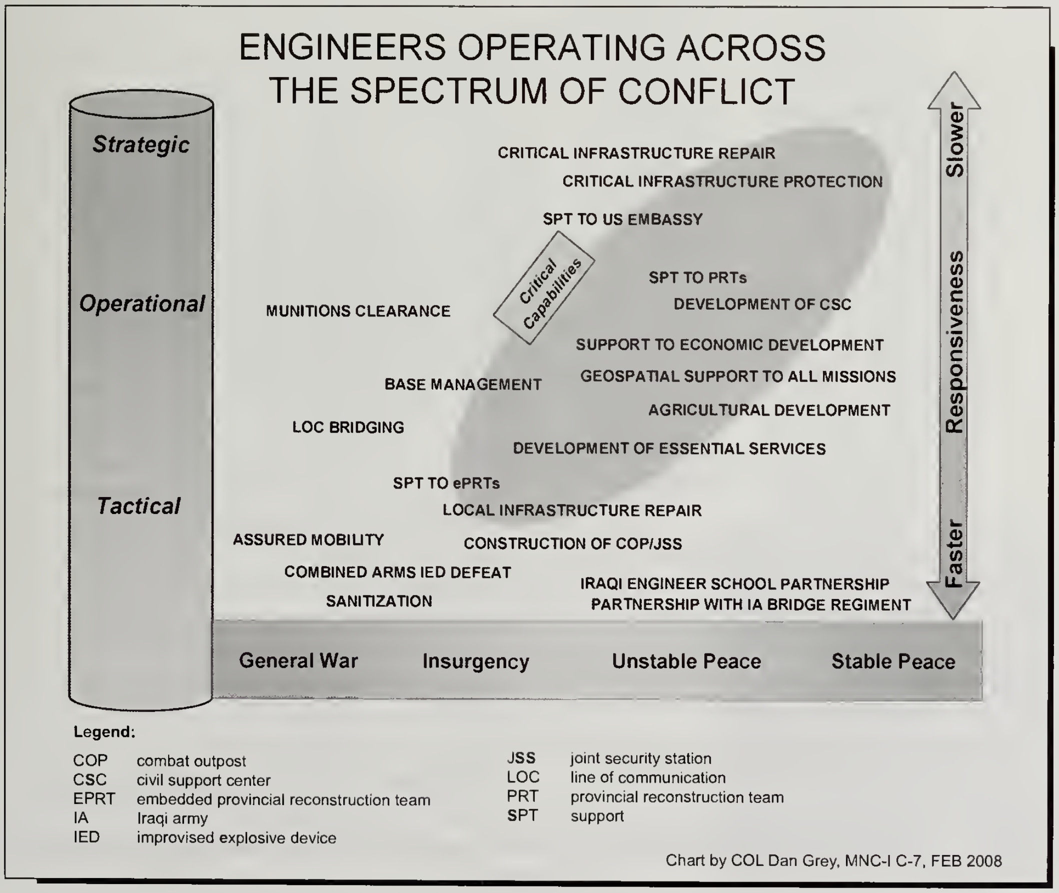

ENGINEERS OPERATING ACROSS THE SPECTRUM OF CONFLICT
Strategic
Operational
Tactical
Slower
Responsiveness
Faster
Critical Capabilities
CRITICAL INFRASTRUCTURE REPAIR
CRITICAL INFRASTRUCTURE PROTECTION
SPT TO US EMBASSY
SPT TO PRTs
DEVELOPMENT OF CSC
MUNITIONS CLEARANCE
SUPPORT TO ECONOMIC DEVELOPMENT
BASE MANAGEMENT
GEOSPATIAL SUPPORT TO ALL MISSIONS
AGRICULTURAL DEVELOPMENT
LOC BRIDGING
DEVELOPMENT OF ESSENTIAL SERVICES
SPT TO ePRTs
LOCAL INFRASTRUCTURE REPAIR
ASSURED MOBILITY
CONSTRUCTION OF COP/JSS
COMBINED ARMS IED DEFEAT
IRAQI ENGINEER SCHOOL PARTNERSHIP
SANITIZATION
PARTNERSHIP WITH IA BRIDGE REGIMENT
General War
Insurgency
Unstable Peace
Stable Peace
Legend:
COP combat outpost
CSC civil support center
EPRT embedded provincial reconstruction team
IA Iraqi army
IED improvised explosive device
JSS joint security station
LOC line of communication
PRT provincial reconstruction team
SPT support

Chart by COL Dan Grey, MNC-I C-7, FEB 2008

Figure 1

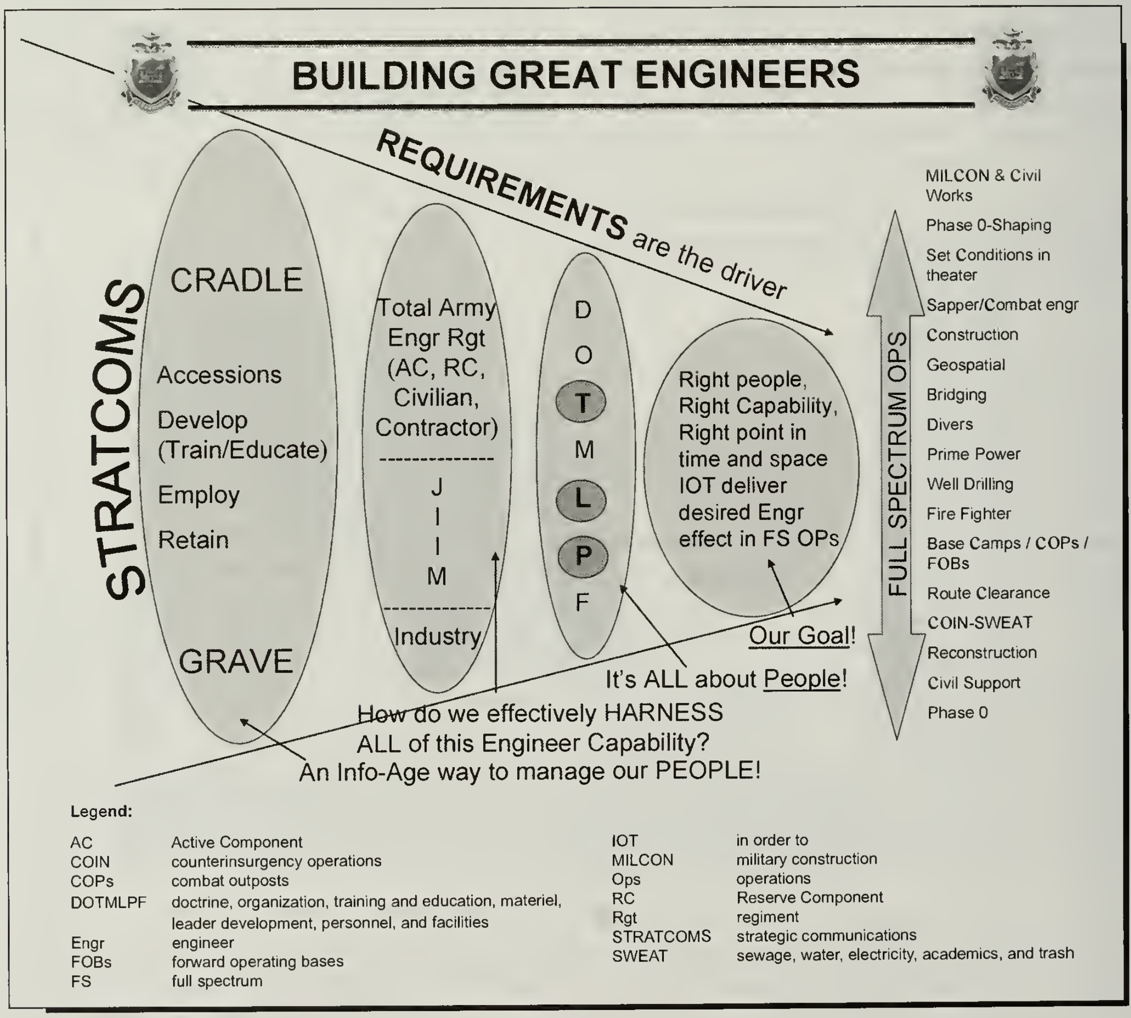
Our goal as a Regiment is to get the right people, with the right capability, at the right point in time and space, in order to deliver the desired engineer effect in full spectrum operations. Although there are many aspects to achieving this, we have chosen to focus initially on the *People, Training and Education*, and *Leader Development* aspects of this goal.

A key challenge is to figure out how to effectively harness all of the great engineer capability we have resident in our total Army Engineer Regiment—which includes the Active Army, Army National Guard (ARNG), United States Army Reserve (USAR), United States Army Corps of Engineers (USACE), Directorates of Public Works (DPWs), and contractors. Yet, we know from experience that even after we harness all of this capability, we still will not have enough engineers to meet all of the requirements and will have to partner with our joint, interagency, intergovernmental, and multinational (JIIM) engineer colleagues. JIIM is the way we will head in the future. More to follow on this as our journey unfolds…

To achieve these desired ends—and with **"Requirements and Future Roles/Missions"** as the driver, we have chosen to pursue a holistic, cradle-to-grave approach (see Figure 2)—to include **"Accessions," "Training and Education," "Employment,"** and **"Retention"**—all wrapped together and linked through a **"Strategic Communications/ Engagement"** plan. With the goal of Building Great Engineers for full spectrum operations and effectively managing our most precious resource—people—ENFORCE 2008 participants broke into six work groups (shown bolded in this paragraph) to ask the big questions, understand the issues, see ourselves, identify gaps, and develop an action plan for the way ahead.

We actually started work back in January when we kicked off our initial Engineer Leader Technical Competency (ELTC) Study. (See previous issues of "The Engineer Blast" and the ENFORCE 2008 issue of *Engineer*, January-March 2008, page 4, for details.) After several months of research, collaboration, analysis, and assessment, the charge to each work group was to start with a blank sheet of paper and unconstrained thinking and—

- Identify low-hanging fruit and quick wins.
- Identify what we do not know and need to investigate (scope out research paper topics to leverage our engineers who are going to school and need paper topics).
- Determine best practices wherever they might be found.
- "Think different," as we develop the way ahead.



Legend:

AC	Active Component
COIN	counterinsurgency operations
COPs	combat outposts
DOTMLPF	doctrine, organization, training and education, materiel, leader development, personnel, and facilities
Engr	engineer
FOBs	forward operating bases
FS	full spectrum
IOT	in order to
MILCON	military construction
Ops	operations
RC	Reserve Component
Rgt	regiment
STRATCOMS	strategic communications
SWEAT	sewage, water, electricity, academics, and trash

Figure 2

Guiding principles were to "Steal [Good] Ideas Shamelessly" (SIS), "Share [Good] Ideas Willingly" (SIW), communicate transparently, brainstorm (there are no "dumb" ideas), cross-talk, collaborate, and inform one another.

In order to unite the Regiment, yet provide diversity of thought, each work group had a healthy mix of uniformed and civilian leaders from all elements of the Regiment, as well as a mix of officers, warrant officers, NCOs and civilians, with a general officer responsible for leading and pulling the effort together.

> *"A key challenge is to figure out how to effectively harness all of the great engineer capability we have resident in our total Army Engineer Regiment..."*

A final step and forcing function was the requirement for each work group to deliver an action plan back-brief to the Chief of Engineers, the Engineer School Commandant, and all of our ENFORCE colleagues on the final day of the conference. This led to a rich dialog and cross-fertilization of ideas. Each work group followed up with a written action plan that was delivered to the Commandant at the end of May. We are now transforming these six written plans into a Regimental Campaign Plan for Building Great Engineers, which I will brief to the Chief of Engineers by the end of July. The Campaign Plan will have clear, measurable goals, objectives, and time lines, which will be tracked and briefed to the senior leaders of the Regiment every quarter. I will brief the Plan to the field during the next Commandant's VTC – you are all invited to listen, dialog, and provide feedback.

In addition, the Chief charged each of the USACE Division commanders to develop a comprehensive and enduring engineer strategic communications (STRATCOM)/Engagement/Outreach Program to tell the Army engineer story, in order to help Build Great Engineers in their respective areas of operation. He directed them to reach out to the entire regimental team in their geographical footprint—to include USACE; troop units of all compos; Reserve Officer Training Corps (ROTC) programs; engineer feeder schools, colleges, and universities; the Recruiting Command; regimental alumni; Families; United States Military Academy (USMA)/ROTC liaison officers; media; relevant professional associations, such as the Army Engineer Association (AEA), Society of American Military Engineers (SAME), Associated General Contractors (AGC), Association of the United States Army (AUSA), and others; politicians; and others who can contribute to our goal of Building Great Engineers. Each Division commander will brief the Chief on his program and execution plan at the USACE Senior Leader Conference in August. The flywheel is beginning to turn—HOOAH!

Let me assure you that this is not a short-term blip on the screen. The intent is to embark on a journey that will plant the seeds and shape our people, such that we will enjoy the fruits of our labor in the form of great engineers for the next century and beyond. This effort is in sync with the Chief's vision of moving from *Good to Great*[1] and being *Built to Last*,[2] in accordance with the two leadership classics by Jim Collins. (We recommend that you read these two books so you catch the Chief's vision and passion for moving our Regiment to the next level.) We will lay out the details and way ahead in future issues of "The Engineer Blast," issues of *Engineer*, VTCs, and other venues in order to ensure transparent communications and dialog.

That, in a nutshell, was the hard intellectual work we did during ENFORCE. We welcome and need your engagement and participation as we embark on our campaign to Build Great Engineers for full spectrum operations in an era of persistent conflict.

Brigadier General Martin is the Commandant of the United States Army Engineer School, Fort Leonard Wood, Missouri. He has served in a wide variety of command and staff assignments, including instructor duty at West Point and the Army War College and Commander of the 130th Engineer Brigade, during full spectrum operations in Europe, Kuwait, and Iraq from 2002- 2004. He is a graduate of the United States Military Academy, Command and General Staff College, and the Naval and Army War Colleges. He holds a master's and a doctorate from the Massachusetts Institute of Technology.

Endnotes

[1] *Good to Great* by Jim C. Collins, Harper Business: New York, 2001.

[2] *Built to Last* by Jim C. Collins and Jerry I. Porras, Harper Business: New York, 1994, 1997.

Turning the
Building Great Engineers (BGE)
Flywheel!

Findings and Preliminary Recommendations From ENFORCE 2008 Work Groups

By Captain William E. Mohr, Colonel Jerry C. Meyer, Colonel Robert A.Tipton, Colonel William H. Haight, Lieutenant Colonel Jeffery A. Anderson, Mr. Steve H. Tupper, and Brigadier General Gregg F. Martin

According to one attendee, if you missed ENFORCE 2008, **you missed the best ENFORCE in nine years.** (The attendee had only been to the last nine!)

Following are just some of the initial findings and preliminary recommendations developed during the Fort Leonard Wood portion of ENFORCE 2008, "Building Great Engineers." While many of the ideas have yet to be approved or prioritized, the intent of this article is to inform the Engineer Regiment of the current status of BGE and a proposed way ahead to increase engineer leader technical and tactical competency for full spectrum operations in an era of persistent conflict. Bold, italicized statements are from the book by Jim Collins, "Good to Great."[1]

"The point is to first get disciplined people who engage in very rigorous thinking, who then take disciplined action within the framework of a consistent system . . ."

The Fort Leonard Wood portion of ENFORCE 2008 built on the foundation of the Engineer Leader Technical Competency (ELTC) work groups. After five months of preparation, the work groups identified the need for engineer leaders to have deep tactical and technical competencies in several areas to support full spectrum engineer operations, which requires the ability to conduct simultaneous offensive, defensive, and stability operations. During the Fort Leonard Wood portion of ENFORCE, attendees representing the entire Engineer Regiment and all ranks rolled up their sleeves and developed specific tasks in each of the six ELTC work group categories that will allow us to build great engineers across the Regiment. The guiding principles were to "Steal [Good] Ideas Shamelessly" (SIS), "Share [Good] Ideas Willingly" (SIW), communicate transparently, brainstorm, cross-talk, collaborate, and inform one another. At the conclusion of the conference, each work group briefed the Chief of Engineers, the United States Army Engineer School Commandant, and all ENFORCE participants on their findings and recommendations. While a consolidated plan of these findings and recommendations is still being formalized for approval and dissemination, following are some outcomes of each work group's efforts. For reference, the six work groups comprising the ELTC Study and ENFORCE 2008 were—

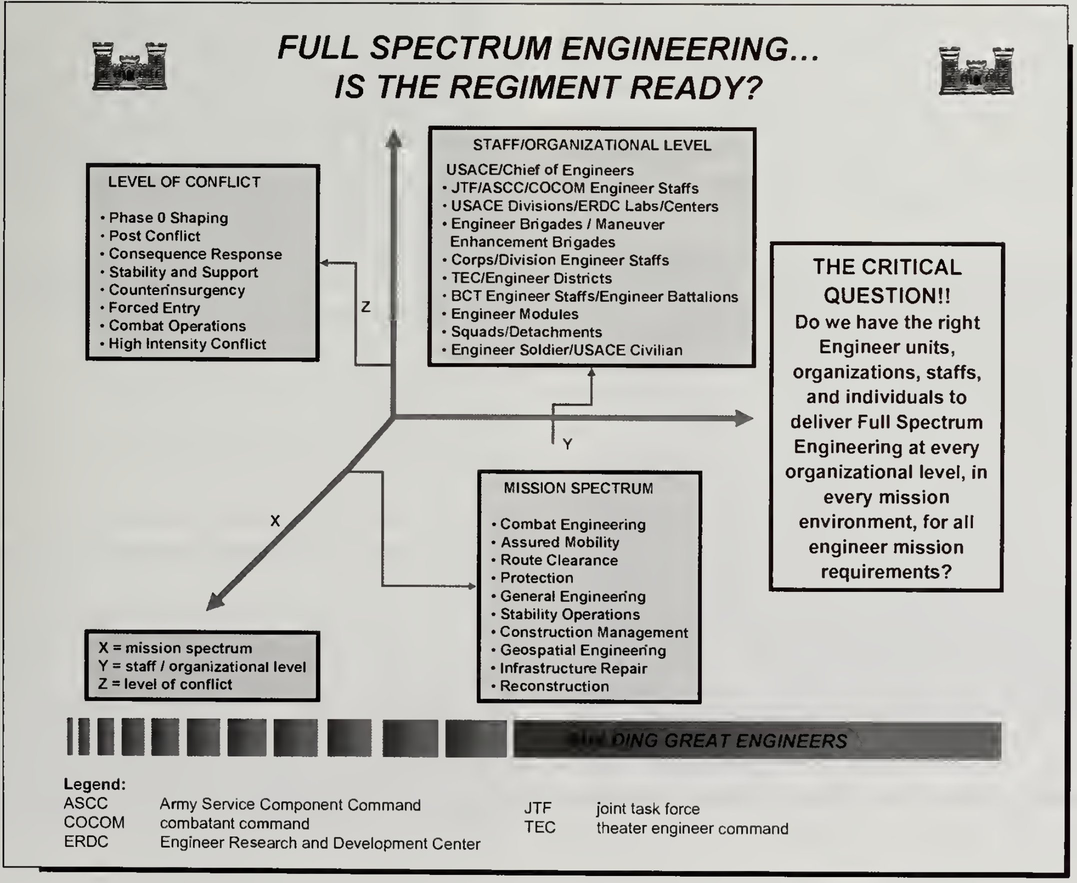
- Future Roles, Missions, Delivery Methods
- Accessions
- Training and Education
- Employment
- Retention
- Strategic Communications

"Great vision, without great people, is irrelevant."

The **Future Roles, Missions, Delivery Methods** work group took a three-dimensional look at the missions engineers are tasked to perform by joint doctrine (see figure below). The critical question we asked ourselves was "Do we have the right engineer units, organizations, staffs, and individuals to deliver full spectrum engineering at every organizational level, in every mission environment, for all engineer mission requirements?"

Throughout the 15-plus hours of focused discussions, a key concept continuously emerged. No matter which mission set we analyzed, the overarching thought was that the Modular Engineer Force provides the Regiment and the Army with the right capabilities for full spectrum engineering. The Regiment is currently challenged when it comes to synchronizing and planning full spectrum engineering. Without an identified and properly resourced and trained engineer staff that fully understands full spectrum engineering operations, the effects at all levels are more likely to be unsynchronized and inefficient.

Another key concept that emerged was that current Army and engineer doctrine does not identify capacity development or capacity building as a resourced mission driver. While the Army's White Paper titled "Stability Operations in an Era of Persistent Conflict," written by MG David A. Fastabend and endorsed by LTG James D. Thurman, identifies the concept and its criticality in full spectrum operations, our doctrine and our task lists do not. To properly resource engineer units for full spectrum operations, we must accept this as a mission and plan for it at all levels. A quote from the White Paper states, "Capacity building is fundamental to success in stability operations. It is the process of creating an environment, supported by appropriate policy and legal frameworks, which fosters institutional development, community participation, human resources development and enterprise creation, and the strengthening of managerial systems. Capacity building is a long-term and continuing process."


FULL SPECTRUM ENGINEERING...
IS THE REGIMENT READY?
LEVEL OF CONFLICT
• Phase 0 Shaping
• Post Conflict
• Consequence Response
• Stability and Support
• Counterinsurgency
• Forced Entry
• Combat Operations
• High Intensity Conflict
STAFF/ORGANIZATIONAL LEVEL
USACE/Chief of Engineers
• JTF/ASCC/COCOM Engineer Staffs
• USACE Divisions/ERDC Labs/Centers
• Engineer Brigades / Maneuver Enhancement Brigades
• Corps/Division Engineer Staffs
• TEC/Engineer Districts
• BCT Engineer Staffs/Engineer Battalions
• Engineer Modules
• Squads/Detachments
• Engineer Soldier/USACE Civilian
Z
Y
X
MISSION SPECTRUM
• Combat Engineering
• Assured Mobility
• Route Clearance
• Protection
• General Engineering
• Stability Operations
• Construction Management
• Geospatial Engineering
• Infrastructure Repair
• Reconstruction
THE CRITICAL QUESTION!!
Do we have the right Engineer units, organizations, staffs, and individuals to deliver Full Spectrum Engineering at every organizational level, in every mission environment, for all engineer mission requirements?
X = mission spectrum
Y = staff / organizational level
Z = level of conflict
BUILDING GREAT ENGINEERS

Legend:

ASCC	Army Service Component Command
COCOM	combatant command
ERDC	Engineer Research and Development Center
JTF	joint task force
TEC	theater engineer command

In a good to great transformation, people are not your most important asset. The right people are.

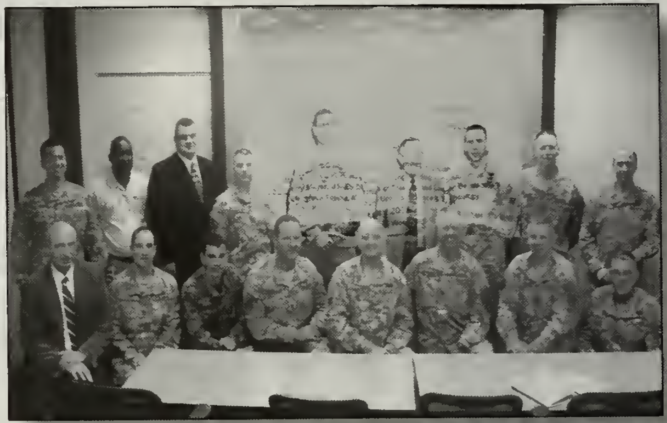
The **Accessions** work group analyzed the methodology by which the Engineer Regiment accumulates talent. The limited lateral entry of qualified personnel into a military career means that the people brought into the Engineer Regiment today will be our leaders tomorrow. Therefore, the accessions methodology becomes a key component of our talent management system and must be thoroughly understood.

Research conducted by the employment work group concluded that over 60 percent of all engineer officer positions require some type of an engineering degree. However, last year only 28 percent of the accessed officers had an engineering degree. In an effort to improve engineer officer accessions, the accessions work group made multiple suggestions.

First, the Army must explore ways to allow the Engineer Branch to access enough officers with engineering degrees. The accessions work group stresses the importance of individuals freely selecting the Engineer Branch, rather than being forced to join the Regiment. The campaign plan must include aggressive strategic communications to those populations deemed most desirable for entry into the Engineer Regiment. It was also recommended that fewer first and second choice nonengineering degreed individuals be admitted into the Regiment, while allowing more second and third choice degreed engineers to branch engineers. Other accessing ideas include the ability to guarantee degreed engineers the automatic opportunity to branch engineers.

Current operational demands require representation from multiple engineering fields, to include (but not limited to) civil, mechanical, electrical, and environmental engineering. Even with a supplemental education plan, the Regiment must access proportional numbers of officers across these fields to ensure that future requirements are fulfilled. One idea to increase lateral entry of talented engineers is to increase engineer marketing to promote branch transfers. The Engineer Regiment can exploit its ability to obtain educated engineers by targeting officers who have an engineering degree who are not in the Engineer Regiment. This accessions strategy can also be applied to Officer Candidate School (OCS), enlisted Soldiers, and the Department of the Army Civilians who round out our Regiment. All of these changes in accession protocol should not be misconceived as a onetime "talent grab" by the Engineer Regiment, but rather as a permanent engineer accessions strategy. The future of the Regiment depends on those we access today.

"Greatness is not a function of circumstance. Greatness, it turns out, is largely a matter of conscious choice."



The **Training and Education** work group focused on enabling execution of the same joint capability areas (JCAs) examined by the futures work group. In reviewing educational systems of U.S. sister Service engineers, as well as allied engineers, it was generally determined that our comrades not only access more degreed engineers, but they invest considerably more in their training and education (time, certifications, etc.) once accessed. Looking across officer, warrant officer, and noncommissioned officer (NCO) personnel categories, the group considered what training or education at what point in a career should occur for which personnel. Using a spreadsheet/matrix approach, they proposed individual training and education that needed to develop over an officer, warrant officer, or NCO career to support the selected JCAs.

A key accomplishment of the group was identification of an extensive methods-of-delivery list that provided a template to help consider different ways to obtain the same knowledge or skill. This list extends beyond Army institutional training to encompass industry experiences, self-development, civilian credentials, and degrees.

Considerable work had been accomplished prior to ENFORCE. Areas of concern included the totality of the United States Army Engineer School (USAES) educational system, current USAES instructional methods, and career educational timelines. To keep pace with the growing technical demands on the Engineer Regiment, the current educational system must be refined and adjusted to ensure a technically skilled workforce, as well as one that is tactically proficient.

The overall USAES educational system must adapt to accommodate more external factors. For example, Army engineers enter the USAES courses at different levels of expertise, but everyone must complete the course requirements through identical methods. Validation testing should be implemented to allow advanced students the opportunity to simultaneously receive beneficial training and education in other areas, rather than waste time repeating known information. To ensure that USAES becomes a world-class teaching operation, teachers need to be carefully interviewed and selected based on individual teaching ability. Improving technical and tactical competency requires assigning the best teachers to be in the schoolhouse, instead of somewhat arbitrarily assigning available personnel.

Instructional methods during all USAES courses need to move into the 21st century style of teaching. Begin by revamping our current classroom instruction into a more hands-on approach to benefit the visual learners and increase realism. Create a wireless classroom by issuing every student a laptop computer and install a wireless network in all USAES classrooms. USAES must provide the infrastructure for every student to learn in an environment that young students are accustomed to.

Currently, our career timeline creates large gaps between levels of formal military schooling. We need to reduce these gaps by incorporating continuing education courses, to include Proponent-Sponsored Engineer Corps Training (PROSPECT) courses, satellite courses, and civilian courses. To further promote a deep technical competency within the Regiment, we need to provide institutional financial support, additional time and pay incentives for seeking higher education, and licensing within the field of engineering. These efforts will foster an environment for technical engineers to grow and retain their proficiency.

"First get the right people on the bus . . . and the right people in the right seats . . ."

The **Employment** work group focused on developing a new employment strategy that evaluates, segregates, and employs individual talent. Currently, the Regiment uses a legacy employment strategy that fills vacant positions with available personnel. Without question, human capital is the greatest asset in the Engineer Regiment, and developing a job assignment system that matches specific talents against requirements is a must.

Analysis of current requirements indicates that approximately 40 percent of all engineer colonel positions would be best served with an officer who has an engineering degree and technical training and certification beyond current professional military education (PME). With over 60 percent of all field grade positions being technical in nature and requiring an engineering or science and technology degree, the Regiment must provide career progressions that will develop technical leaders. Engineering competency results from the combination of education and experience; therefore, the Regiment must employ technically educated engineers along defined career paths that allow them to gather the necessary engineering experiences to become technically proficient. Specific career paths must still be developed, but one immediate employment idea is to place junior engineer leaders assigned to modified table of organization and equipment (MTOE) engineer units at installations with United States Army Corps of Engineers (USACE) field offices into short-term USACE utilization assignments to support the development of needed technical skills.

There is great potential with the newly expanded role of engineer 210A warrant officers to address some capability gaps. However, significant effort is needed to develop the appropriate education and employment strategy to support their development into effective technical experts at the platoon or entry level. Additional analysis is still needed to define the requirements for engineer NCOs, and initial indications are that updated career road maps are needed for them as well.

One method proposed to implement this new talent management system is to develop the "Green Pages" concept. Specifically, this concept is an interactive online database that allows individuals to post resumes and organizations to post available positions, which allows for an interactive talent search. The data input by users and the various personnel assignment organizations will create an open job market. By creating a competitive job market, individuals will have to develop their talents to be competitive for desired positions. In return, the Engineer Regiment will yield an increase in technical competency and a more professional workforce.

"Tremendous power exists in the fact of continued improvement and the delivery of results. Point to tangible accomplishments . . . people see and feel the buildup of momentum, they will line up with enthusiasm."

The **Retention** work group found that current retention rates and trends reveal that the Engineer Branch is losing junior officers at a faster rate than the Army average, and degreed engineer officers are leaving the Army at a higher rate than those without an engineering degree. Similarly, rates of separation for enlisted personnel are on the rise, particularly at the 20-year mark. To begin to reduce these rates, the retention work group suggests an immediate improvement in individual mentorship and professional development. Alarming information has arisen from the Building Great Engineers project that many of the junior members of the Regiment are uneducated about future positions, engineering educational opportunities, and other career-enhancing opportunities that are provided by the Regiment. It is believed that a focused and dedicated mentorship program would improve retention rates by continuing to educate junior members on all the Engineer Regiment can offer.

In general, the Engineer Regiment must strive to become an adaptable organization that fulfills the needs of our people. The retention work group provided numerous ways to improve the quality of life within the Engineer Regiment. Recommended improvements will focus on incentive pay for technical engineers, additional duty service obligation requests for enlisted post of choice, increased USACE positions for young officers to use their technical degrees, and more flexible moves between the Reserve Component and Active Army. Results from the retention work group also stressed the need for a more adaptable employment plan that would attempt to fulfill individual desires on type of job and job locations. A balance of current Army requirements with personal career ambitions must be achieved to improve retention trends.

"Step by step, action by action, decision by decision, turn by turn of the flywheel—that adds up to sustained and spectacular results."

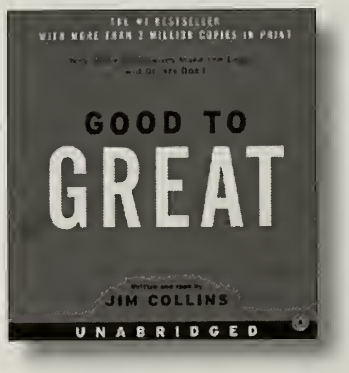
Tasked with analyzing and updating the engineer marketing plan, the **Strategic Communications** work group identified multiple areas to improve, but updating and improving the engineer website is the top priority. Other 21st century communications methods need to be improved as well, to include engineer videos, television ads, shows, and creating an interactive web portal.

Prior to the creation of our delivery methods, concentrated efforts must be conducted to create an effective engineer brand and a coordinated marketing plan. The current marketing organization is disconnected; USAES, USACE, and other engineering organizations fail to portray supporting marketing messages. Websites need to be compatible, information needs to be similar, and engineering messages should be consistent among all of these sources. Additional efforts should focus on researching the most effective modes of communication and determining the Regiment's target audience. With a focus on how to market and to whom, the Regiment can proceed to produce an effective marketing plan.

The strategic communications work group identified the need for a more proactive marketing approach. Local USACE offices and other engineer units have been tasked to interact with surrounding schools, communities, and youth to promote the Regiment. Specifically, the units have been assigned to educate local youth about the engineers and to encourage young college students to seek an engineering degree. The intent of such a proactive plan is to improve the quality of engineers that are accessed into the Regiment.

How can we possibly accomplish some of these actions in a time of war? This is precisely the right time to do so! (See the Chief of Engineers' "Building the Bench" article on page 10!) We are already seeing implementation and progress! Senior engineer leaders are visiting our best engineering colleges and universities, explaining the opportunities available in the Regiment . . . thousands of United States Military Academy (USMA) and Reserve Officer Training Corps (ROTC) cadets are being introduced to the branch in a spectacular fashion during summer camps . . . videos and promotional materials are being developed . . . nearly 70 percent of the officers branching engineers commissioned from the West Point class of 2008 had engineering degrees (a huge increase from last year) . . . use of laptops and a wireless classroom in the Engineer School is being piloted this summer . . . coordination to leverage sister Service educational courses is ongoing . . . USACE commanders are organizing regionally-based communication and execution confederations of engineer stakeholders, such as Military Academy Liaison Officers, ROTC units, engineer units, Recruiting Command, USACE assets, key university feeder schools, and public and private organizations and stakeholders . . . the flywheel is beginning to turn!

"There is a sense of exhilaration that comes in facing head-on the hard truths and saying, 'We will never give up. We will never capitulate. It might take a long time, but we will find a way to prevail.'"



The findings and recommendations in this article are not all-inclusive of the work that was done by the ELTC and ENFORCE work groups. To tie together all of the recommendations and findings, we will publish a "Regimental Campaign Plan" that will become a touchstone document for engineers for the next 5-10 years. On 8 and 9 July, a Council of Colonels met at Fort Leonard Wood to prioritize and direct tasks to all members of the Regiment. We will continue to use the *Engineer Professional Bulletin*; *The Engineer Blast*; "Building Great Engineers," located at the Engineer School Knowledge Network on Army Knowledge Online (AKO); and e-mails to continue to update the entire Regiment on our progress to Build Great Engineers for the future!

Captain Mohr is the action officer for the Building Great Engineers project at the United States Military Academy at West Point, New York, where he received a bachelor's in civil engineering in 2004.

Colonel Meyer is the Director of Training and Leader Development at the United States Army Engineer School, Fort Leonard Wood, Missouri. He is a graduate of the United States Military Academy and has had two tours at West Point. He holds a master's in chemical engineering from the Massachusetts Institute of Technology.

Colonel Tipton is the Assistant Commandant, United States Army Engineer School, Fort Leonard Wood, Missouri. Previously the Maneuver Support Center Director of Training, he holds a master's in civil engineering from Montana State University and a master's in strategic studies from the Army War College and is a licensed professional engineer in Virginia.

Colonel Haight is the Director, Office of the Chief of Engineers, on the Army Staff. Previous assignments include C7 Engineer, Multinational Corps-Iraq, and Commander, Engineer Brigade, 1st Infantry Division. He holds a master's in mechanical engineering from the University of Washington and a master's in strategic studies from the Army War College and is a licenced professional engineer in Virginia.

Lieutenant Colonel Anderson is the Plans Chief in the Office of the Chief of Engineers in the Pentagon. He has had a variety of assignments, to include assistant division engineer in the 1st Armored Division; mathematics instructor at West Point; battalion and brigade executive officer in Giessen, Germany; and company commander in Fort Carson, Colorado.

Mr. Tupper serves as a liaison from the University of Missouri to Fort Leonard Wood, working issues in education, research, and economic development. He retired from the Army in 2003 after serving in various engineer units and staffs, to include a stint as a professor of military science (ROTC) and as an associate professor of electrical engineering at the United States Military Academy. He holds a master's in electrical engineering from the Georgia Institute of Technology and is a licensed professional engineer.

Brigadier General Martin is the Commandant of the United States Army Engineer School, Fort Leonard Wood, Missouri. He has served in a wide variety of command and staff assignments, including instructor duty at West Point and the Army War College and Commander of the 130th Engineer Brigade, during full spectrum operations in Europe, Kuwait, and Iraq. A graduate of the United States Military Academy, Command and General Staff College, and the Naval and Army War Colleges, he holds a master's and a doctorate from the Massachusetts Institute of Technology.

Endnote

[1] *Good to Great* by Jim C. Collins, Harper Business: New York, 2001.

("Building the Bench," continued from page 10)

to make sure people know what we do and what opportunities exist within the Regiment. The USACE New Orleans District is leading the way and setting a high bar in this arena. In fact, we are using some innovative ways to build the bench in the "Big Easy," such as networking and building relationships with faculty at universities, deans of engineering schools, and professors who are tapped into the skills and strengths of particular students. Of course, this will supplement—not replace—our traditional recruiting at career fairs and other direct-to-student efforts.

We are going to target our recruiting more appropriately to the specific competencies we will need in the future, as a result of our "gap" analysis. So we'll seek out specific skills, such as geotechnical or geographic information systems (GIS), and reach out to students and institutions with those strengths. To be *Built to Last*, we need people who are masters in their trade, as well as all-round skilled "pentathletes."

This is the beginning of getting the *Good to Great* "flywheel" in motion. We are just getting it started and, as we continue to focus on improving our technical competency and building a bench of disciplined people, we will gain momentum.

Thanks for joining in this critical "walnut." When we look back four or five years from now and see a Regiment *Built to Last*, you will have left an indelible print on our profession and our nation!

Lieutenant General Van Antwerp is the 52d Chief of Engineers and Commander of the United States Army Corps of Engineers. Previous assignments include Commanding General, United States Army Accessions Command and Deputy Commanding General for Initial Military Training at Fort Monroe, Virginia; Commanding General, United States Army Maneuver Support Center and Fort Leonard Wood, Missouri, and Commandant, United States Army Engineer School; United States Army Corps of Engineers Los Angeles District; the United States Army Division, South Atlantic, Atlanta, Georgia; and the 326th Engineer Battalion, 101st Airborne Division (Air Assault), during Operations Desert Shield and Desert Storm.

Endnotes

[1] *Good to Great* by Jim C. Collins, Harper Business: New York, 2001.

[2] I actually do have a jar full of walnuts and rice. The walnuts represent priorities, and the rice represents all the other stuff—the ankle-biters that get in the way all the time. If you dump out the jar, and try to put everything back in, you have to put the walnuts in first; if you put the rice in, and then try to add the walnuts, they won't fit and you'll end up breaking some walnuts when you try to close the jar. If you put the walnuts in first, then add the rice, the rice will work itself around all the walnuts and fit in where it can. The message being—tackle the priorities first, and then fit all the other stuff in as you can.

[3] *Built to Last* by Jim C. Collins and Jerry I. Porras, Harper Business: New York, 1994, 1997.

Developing an Engineer Leader Technical Competency Strategy:

Accessing, Developing, Employing, and Retaining Talent

By Colonel E. Casey Wardynski, Major David S. Lyle, and Captain William E. Mohr

The Engineer Leader Technical Competency (ELTC) Strategy must embody a holistic approach that accesses, develops, employs, and retains talent matched to engineer objectives. Military career paths, with their associated rank structure and progression, inhibit entry of talent from the civilian sector. Consequently, the Engineer Regiment can only develop, employ, and retain the talent that it initially accesses.

Where the Regiment lacks scope to selectively retain and advance talented leaders, it will incur higher costs for leader development and risks associated with unfit talent. Perhaps even more central to the ELTC Strategy, efforts must begin to match competency requirements to individual competencies. In so doing, the Regiment will move beyond assignment management and into talent management. By placing the right leader in the right job at the right time, the Regiment stands to reap benefits not only with operational efficiency but also in its ability to access, retain, and develop talent. Thus, accessions, development, employment, and retention of talent are interdependent processes that must be addressed holistically.

To create an ELTC Strategy, senior leaders must agree upon their strategic objectives. A review of recent officer accessions guidance reveals that only quantities were discussed; guidance omitted accession objectives with regard to officer competencies, abilities, or aptitudes. Even though objectives for such qualities are not explicitly set out in official accessions policy, they have gained increased prominence as leader development imperatives. More specifically, senior leaders have expressed qualitative requirements using such terms as "pentathlete" or "adaptive" leaders. The originators of the pentathlete term envisioned leaders who embody a range of competencies beyond those narrowly associated with combat operations.

By expressing the need for leaders with increased technical competencies and aptitudes for rapid learning and adaptation, senior leaders are in fact articulating the objectives for an ELTC Strategy. In essence, those who have skills beyond traditional combat objectives—the ability to quickly discern patterns of activity within new situations and conceive alternatives to address situations for which they have never been specifically trained—are exactly the demands of senior Army leaders. To allow requirements for specific competencies to evolve over time, we simply refer to these requisite skills as "talent."

Central to underpinning an all-encompassing strategy, the Regiment must build adaptability into its talent management organizations and processes. In other words, rather than relying solely upon a leader's capacity to adapt, the Regiment must embrace organizational adaptability. Such an approach provides greater depth in technical engineering competencies. For example, a strategy with the objective of producing adaptive individuals without an adaptable organizational structure is likely to result in personnel who are an inch deep and a mile wide. Few individuals have the aptitude to achieve expertise in multiple fields. However, by allowing engineers to specialize in a few areas of expertise and by building adaptable organizations that can employ the right talent to the right job at the right time, the Regiment can achieve a pentathlete capability but with much greater depth in competencies.

This is not to say that the Army does not also need adaptable leaders. Rather, the object of the ELTC Strategy should be a distribution of talent and a management system that can employ talent effectively.

Specifically for the officer corps, a focus on talent management reinforces development and retention programs in at least two ways. First, developmental assignments improve officer competencies gained during precommissioning education, postcommissioning institutional training, and advanced civil education. Second, achieving a close match between officer interests, competencies, and utilization directly improves officer career satisfaction and success, which sets the conditions to garner extended service among high-potential leaders. Thus, increased capacity to employ officer talent should serve as the capstone to access, develop, and retain high-potential, high-performance leaders.

Given the foregoing, an effective ELTC Strategy will recognize the interdependency of accessing, developing, employing, and retaining talent. The strategy must acknowledge the need for organizational adaptability to foster and benefit from depth in leaders' competencies. Finally, to make the strategy timeless, it must allow the attributes that define talent over time. In so doing, the strategy will leverage resources, policies, and organizations to achieve the objective of employing the right talent in the right job at the right time to meet future requirements.

Colonel Wardynski is the director of the Office of Economic and Manpower Analysis at the United States Military Academy at West Point, New York.. He holds a doctorate in public policy from the Frederick S. Pardee RAND Graduate School.

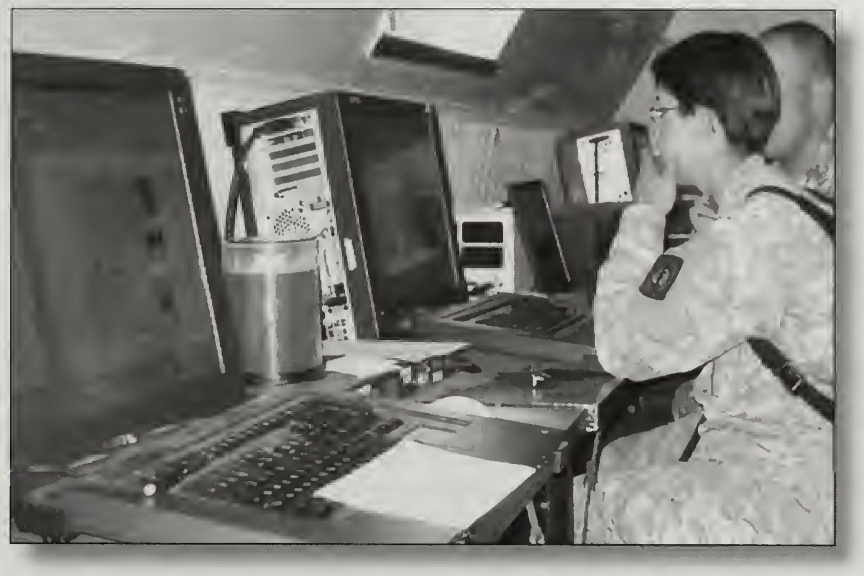
Major Lyle is deputy director of the Office of Economic and Manpower Analysis. He holds a doctorate in economics from the Massachusetts Institute of Technology.

Captain Mohr is the action officer for the Building Great Engineers project at the United States Military Academy at West Point, New York, where he received a bachelor's in civil engineering in 2004.

Harnessing the Technical Span of Control

By Major Jared L. Ware

The future engineer force and modularity have increased the technical span of control for combat effects engineer battalions. "Span of control" refers to the number of subordinate units a commander must command and control; at the battalion level, that is normally three to five companies of similar capabilities. Major William G. Pierce, an engineer officer, wrote a monograph on operational span of control in 1991 while a student at the Command and General Staff College. He concluded that the military education system is the primary factor that will enable a commander to expand his span of control. This holds true today as the Regiment organizes various capabilities into its existing battalions and brigades.



Engineers from the 65th Engineer Battalion conduct geospatial analysis in a field environment.

Technical Span of Control

A former commander of the 29th Engineer Battalion (Topographic) coined the phrase "technical span of control" to explain the structure of the unit, which was topographic in name only: the battalion had a dive detachment, a transportation company, a topographic company, and a topographic planning and control element. The success of the unit truly depended on the background of leaders entering the unit and their ability to broaden their horizons by understanding the capabilities of the units through the study of doctrine and operational experience gained while assigned to the battalion.

The key question to examine as the Regiment transforms is how it will prepare future battalion and brigade commanders to effectively lead with the increased technical span of control. Currently, there is no integrated training and education plan—or even a suggested career path—for future leaders to follow to strengthen their skill sets. Moreover, the current debate on the technical proficiency of engineer leaders suggests that the emphasis on a combat-oriented mentality has contributed to a decline in skills. That may explain part of the decline, but the increased technical span of control within combat effects battalions, with additional companies and detachments assigned to battalion flagpoles, has increased the demand for technical competency at all levels. If the Regiment fails to address this issue, the image of the Regiment could slowly erode to the point where "Essayons" is merely a catchphrase instead of our sacred creed. By taking some immediate steps, the Regiment can improve the ability of its leaders to harness their technical span of control and succeed in the engineering challenges ahead.

Training Junior Leaders

The 65th Engineer Battalion (Combat Effects) can be used to illustrate the issues associated with technical span of control because the battalion covers the combat, general, and geospatial engineering spectrums. Also, I can expound on the issue based on personal experience and empirical evidence. The battalion consists of a headquarters company, a forward support company, a geospatial planning cell, a dive detachment, a topographic company, an engineer support company, a clearance company, and an attached chemical company. The battalion will also activate a sapper company and an explosive hazards team in the near future. Understanding that it is difficult for one person to master all of these capabilities in a short amount of time, the battalion has focused on training its junior leaders on the various engineer capabilities. The goal is to introduce them to the battalion's capabilities, offer them the opportunity to serve in more than one type of unit, and expand their overall technical proficiency.

Sappers from the 65th Engineer Battalion conduct demolition operations at Pohakuloa Training Area, Hawaii.

To address the increased technical span of control, the battalion has implemented an officer development and certification program to address technical proficiency at the junior officer level. This program is a series of 65 events that cover basic officer tasks as well as tasks related to combat, construction, and geospatial engineering. The battalion commander also closely manages the officer slate to ensure that junior officers, including dive-qualified officers, can serve in more than one type of engineer unit. Field grade officers have been selected based on a mixed background in combat, construction, geospatial and/or general engineering to ensure that no "single-tracked" mentality degrades the battalion's diverse training plan. The battalion's emphasis on training and education, as well as its ability to bring in multifaceted leadership, has significantly improved its technical span of control. Moreover, it has improved the commander's ability to command, control, and direct engineer capabilities with greater confidence in mission success. The ability to increase the technical span of control is directly proportional to the training and education of key leaders in multiple facets of full spectrum engineering.

Soldiers from the 71st Chemical Company generate smoke at Pohakuloa Training Area.

A doctrinal or organizational modification cannot completely alleviate the span of control gap, particularly with the modular engineer force requirements. The answer lies in the training and education of field grade and company grade officers, since they are the major decision-makers in training and equipping their units. Junior leaders must understand the limitations of the battalion headquarters and strive to become the technical experts in their respective units. The more technically qualified the leaders at the company level, the further the battalion commander can expand the battalion's technical span of control. The inverse is also true; the less technically competent the junior leaders, the smaller the technical span of control at the battalion level.

Learning engineer organizations and their capabilities requires continuous training, education, and operational experience, which will allow the Regiment to prepare its future leaders to feel comfortable with an increased technical span of control.

Future Emphasis

Continuous Learning. Expand distance learning training and mandate its completion as an educational requirement. The Army's sister Services require engineers to obtain professional engineer designations. At a minimum, the Army could have engineer officers watch a few training videos online during the Basic Officer Leadership Course, Engineer Captains Career Course, or intermediate-level learning courses and document their completion with a certificate. Review the current engineer force structure and immediately address all significant leader training shortfalls with a more robust educational package.

Expand Unit Nomenclature. Keep the headquarters table of organization and equipment structure, but expand the nomenclature, naming battalions according to their missions and subordinate capabilities, such as *combat*, *construction*, or *prime power*. The "effects" title is confusing, especially when there are dive teams and geospatial planning cells in the same battalion structure. Review the naming conventions and get feedback from the field on whether or not the current structures enhance or detract from the Regiment's image.

Feedback From Engineer Leaders. Examination of the careers of current active duty engineer brigade commanders shows that they served key leadership and staff assignment time in either combat or construction units only. Each brigade now has at least one combat effects battalion and one construction effects battalion, as well as other companies and detachments that cover the gamut of full spectrum engineering. Perhaps these leaders could share their insight on topics such as, "If I had trained in this area, or had served in this type of unit, or had received this type of education, then it would have given me a wider technical span of control."

Good venues to share ideas could be—

- The Engineer Portal (<*https://www.mwu.army.mil/portal/eng/index.php*>)
- "The Engineer Blast," published by the United States Army Corps of Engineers. For past issues, login to Army Knowledge Online (AKO) and type in <*https://www.us.army.mil/suite/folder/1066848*>.
- The Engineer Leader Technical Competency site at AKO. To gain access to the site, e-mail Captain Mark Conrad at <*mark.aaron.conrad@us.army.mil*>.

Major Ware is the executive officer of the 65th Engineer Battalion (Combat Effects). He has served in the United States and overseas in a variety of engineer assignments. His e-mail address is <jared.ware@us.army.mil>.

The Engineer Writer's Guide

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

Articles submitted to *Engineer* must be accompanied by a written release by the author's unit or activity security manager prior to publication. All information contained in the article must be unclassified, nonsensitive, and releasable to the public. *Engineer* is distributed to military units worldwide and is also available for sale by the Government Printing Office. As such, it is readily accessible to non-government or foreign individuals and organizations.

We cannot guarantee that we will publish all submitted articles. They are accepted for publication only after thorough review. If we plan to use your article in an upcoming issue, we will notify you. Therefore it is important to keep us informed of changes in your e-mail address and telephone number. All articles accepted for publication are subject to grammatical and structural changes as well as editing for style.

Send submissions by e-mail to <*leon.engineer@conus.army.mil*> or on a 3 1/2-inch disk or CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication by other Army professional bulletins.

The Army Profession, the Engineer Regiment, and the Character of Their Leaders

By Dr. Don M. Snider

As the Engineer Regiment considers how best to attract and retain the future leadership corps it needs—commissioned officers, noncommissioned officers, and civilians—for this new era of persistent conflict, there are three factors with major implications for the Regiment's current efforts.

Implications for the Present

Profession vs. Bureaucracy. First, the Army that the Engineer Regiment serves is always precariously balanced between being a trusted vocational profession and being just another governmental bureaucracy. For many valid reasons, it is incredibly important which culture—profession or bureaucracy—is predominant within the Army and within the unit climate of each of its subelements. Among the most important reasons for the Army to be a profession are the following:

- There is no history of a bureaucracy ever creating the expert knowledge and practice of modern warfare. If America is to have effecive land forces, the United States Army must be, and function as, a profession—not as a bureaucracy.
- Without a professional culture and its inherent ethos, the essential trust relationship between the Army and the American people it serves—one based on the Army's expert capabilities and the effectiveness of their use—will be ruptured and at a potentially terrible price to both. After Abu Ghraib and similar incidents, some of that trust evaporated and only now is being regained.

Role of Army Leaders. The most significant factor in the resolution of this inherent tension between the two types of armies—professional or bureaucratic—will be the role played by Army leaders of all stripes. Day by day they will determine by their decisions, their presence, and their modeling whether America's sons and daughters serve in the satisfying, fulfilling role of "a professional and an expert" (as the Soldier's Creed states) or whether they will come to see themselves as merely time-serving government bureaucrats with no influence. Stated another way, the climate within any unit reflects accurately both the competence and the character of the leadership of that unit. As they have done in the past, Soldiers will rightly continue to ask their leaders, including their Engineer Regiment leaders, "How can I be a professional if there is no profession?"

Development of Moral Character. The Army is generally very good at developing the tactical and technical competencies of its leaders; training in military skills has long been a strong suit among the Army's core developmental routines. But it is equally clear that the Army is not nearly so good at developing, or more accurately, facilitating the development of the moral character of its leaders. Fortunately, the experiences of the Army in Iraq and Afghanistan have now renewed interest in a broader range of the human dimensions of such warfare and of the demands it places on Army leaders. To develop Army leaders for the future will take more than education and training. It will also take inspiration—individual moral awareness and development of a type that will allow leaders fully to accept and support the profession's ethic by "living it 24/7."

Implications for the Future

The issue this leads to is the moral character of Army leaders and the Army's ability to understand the leader's fighting spirit, the individual spirituality that so strongly informs individual character. This is not a new subject for the Army. Many older Soldiers will remember that for the post-World War II generation, General George C. Marshall spoke matter-of-factly about the common understanding within the Army: "The Soldier's heart, the Soldier's spirit, the Soldier's soul are everything. Unless the Soldier's soul sustains him, he cannot be relied on and he will fail himself, his commander, and his country in the end. It is not enough to fight. It is the spirit that wins the victory." [1]

How then does the Army, and those involved in the effort to rethink the development of leaders within the Engineer Regiment, understand and discuss the inspiration of individual leaders and its influence on their moral character and thus on their behavior, particularly in combat? The Army's approach centers on the Warrior Ethos, which has been promulgated as a four-sentence portion of the Soldier's Creed: *"I will always*

"Research from Iraq continues to show that authentically moral leaders better earn their followers' trust and thus possess a greater ability to exercise high-impact leadership."

place the mission first. I will never accept defeat. I will never quit. I will never leave a fallen comrade." However, while concluding that it is crucial for "all Soldiers [to] truly understand and embody this Warrior Ethos," the doctrine is almost silent on how such an element of character is embodied, developed, and sustained. There is no language, no developmental model, no suggested pedagogy. Even more unhelpfully, the doctrine states, "While individuals are responsible for their own character development, leaders are responsible for encouraging, supporting, and assessing the efforts of their people." [2]

Competence vs. Character

So how are Army leaders to fulfill this critical leadership role if the Army dismisses character development as the responsibility of the individual?

For the engineer leadership working on the Building Great Engineers project, there are two suggestions. The first is to update the Engineer Regiment's (and thus the profession's) knowledge of human development with language and developmental models that elevate the understanding and discussion of human spirituality to where it belongs and where it exists in current university research programs—to a position above religion. (For example, see *<http://www.spirituality.ucla.edu >*.) Simply stated, this means that the Regiment understands and accepts that the spirituality of its Soldiers and leaders—their inspiration and worldview that shape character—can be informed by many sources, only one of which might, at the choice of the individual, be religion.

The second suggestion is that the leadership adopt the position that the Regiment's institutional role and responsibility in the realm of the Soldier's inspiration is to facilitate the individual's search for the moral meaning that defines a leader's personal character. This means moving beyond the Army's current "we don't do that" approach to the character development of its Soldiers and leaders. Research from Iraq continues to show that authentically moral leaders better earn their followers' trust and thus possess a greater ability to exercise high-impact leadership. In a stateside setting, this means producing leaders who are better able to mentor Soldiers and junior leaders, and thus the developmental process goes on and on.

This is not to suggest that the Regiment decrease its emphasis on developing the tactical competence of its Soldiers or leaders. However, the Regiment should restore appropriate balance to the development of both their competence and character. Both remain, as operations in Afghanistan and Iraq have repeatedly shown, essential to Soldiers and leaders in effective fighting forces.

Summary

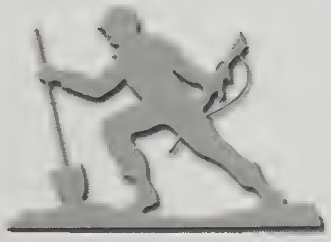
In summary, the result of implementing these two suggestions over time should be two very salutary developmental outcomes for the Engineer Regiment and for the Army profession. Soldiers and leaders will be better grounded individually in what they believe and in their strength of will to act on those beliefs. And the dissonance between what they believe and hold dear and what the institution declares is "right"—according to the professional military ethic embodied in traditions such as the seven Army Values—would be reduced. Both outcomes move the Regiment and the profession in the direction of a more cohesive and effective fighting force.

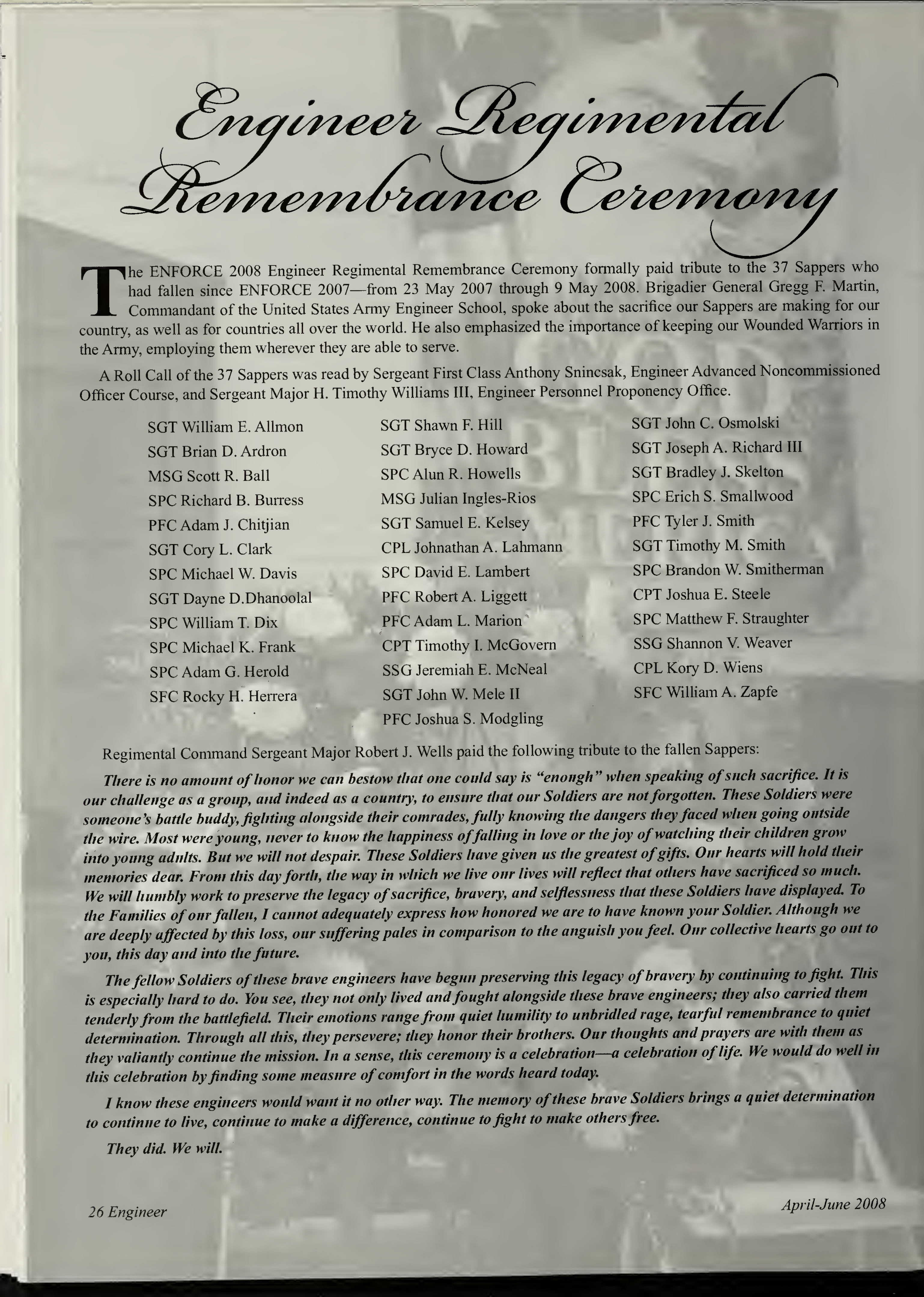
Dr. Snider served three combat tours as an infantryman in Vietnam and commanded a battalion in the 7th Infantry Division. In his final active duty position, he served in the Office of the Chairman, Joint Chiefs of Staff. He retired from the Army in 1990 and in 1998 was appointed to the civilian faculty at the United States Military Academy at West Point, New York, where he is now a professor emeritus. He holds a doctorate in public policy from the University of Maryland and masters' in economics and public policy from the University of Wisconsin. He is a member of the Council on Foreign Relations and serves on the executive committee of the Inter-University Seminar on Armed Forces and Society.

Endnotes

[1] H.A. DeWeerd (Editor) "Selected Speeches and Statements of General of the Army George Catlett Marshall," *The Infantry Journal*, 1945.

[2] Field Manual 6-22, *Army Leadership*, 12 October 2006.





Engineer Regimental Remembrance Ceremony

The ENFORCE 2008 Engineer Regimental Remembrance Ceremony formally paid tribute to the 37 Sappers who had fallen since ENFORCE 2007—from 23 May 2007 through 9 May 2008. Brigadier General Gregg F. Martin, Commandant of the United States Army Engineer School, spoke about the sacrifice our Sappers are making for our country, as well as for countries all over the world. He also emphasized the importance of keeping our Wounded Warriors in the Army, employing them wherever they are able to serve.

A Roll Call of the 37 Sappers was read by Sergeant First Class Anthony Snincsak, Engineer Advanced Noncommissioned Officer Course, and Sergeant Major H. Timothy Williams III, Engineer Personnel Proponency Office.

SGT William E. Allmon
SGT Brian D. Ardron
MSG Scott R. Ball
SPC Richard B. Burress
PFC Adam J. Chitjian
SGT Cory L. Clark
SPC Michael W. Davis
SGT Dayne D.Dhanoolal
SPC William T. Dix
SPC Michael K. Frank
SPC Adam G. Herold
SFC Rocky H. Herrera
SGT Shawn F. Hill
SGT Bryce D. Howard
SPC Alun R. Howells
MSG Julian Ingles-Rios
SGT Samuel E. Kelsey
CPL Johnathan A. Lahmann
SPC David E. Lambert
PFC Robert A. Liggett
PFC Adam L. Marion
CPT Timothy I. McGovern
SSG Jeremiah E. McNeal
SGT John W. Mele II
PFC Joshua S. Modgling
SGT John C. Osmolski
SGT Joseph A. Richard III
SGT Bradley J. Skelton
SPC Erich S. Smallwood
PFC Tyler J. Smith
SGT Timothy M. Smith
SPC Brandon W. Smitherman
CPT Joshua E. Steele
SPC Matthew F. Straughter
SSG Shannon V. Weaver
CPL Kory D. Wiens
SFC William A. Zapfe

Regimental Command Sergeant Major Robert J. Wells paid the following tribute to the fallen Sappers:

There is no amount of honor we can bestow that one could say is "enough" when speaking of such sacrifice. It is our challenge as a group, and indeed as a country, to ensure that our Soldiers are not forgotten. These Soldiers were someone's battle buddy, fighting alongside their comrades, fully knowing the dangers they faced when going outside the wire. Most were young, never to know the happiness of falling in love or the joy of watching their children grow into young adults. But we will not despair. These Soldiers have given us the greatest of gifts. Our hearts will hold their memories dear. From this day forth, the way in which we live our lives will reflect that others have sacrificed so much. We will humbly work to preserve the legacy of sacrifice, bravery, and selflessness that these Soldiers have displayed. To the Families of our fallen, I cannot adequately express how honored we are to have known your Soldier. Although we are deeply affected by this loss, our suffering pales in comparison to the anguish you feel. Our collective hearts go out to you, this day and into the future.

The fellow Soldiers of these brave engineers have begun preserving this legacy of bravery by continuing to fight. This is especially hard to do. You see, they not only lived and fought alongside these brave engineers; they also carried them tenderly from the battlefield. Their emotions range from quiet humility to unbridled rage, tearful remembrance to quiet determination. Through all this, they persevere; they honor their brothers. Our thoughts and prayers are with them as they valiantly continue the mission. In a sense, this ceremony is a celebration—a celebration of life. We would do well in this celebration by finding some measure of comfort in the words heard today.

I know these engineers would want it no other way. The memory of these brave Soldiers brings a quiet determination to continue to live, continue to make a difference, continue to fight to make others free.

They did. We will.

Photo by Multimedia Visual Information Service Center

Regimental Awards

Each year, we recognize the best engineer company, lieutenant, noncommissioned officer, and enlisted Soldier—in each of the components—for outstanding contributions and service to our Regiment and Army. Every engineer unit in the Regiment can submit the name and achievements of its best of the best to compete in these distinguished award competitions. Only the finest engineer companies and Soldiers are selected as recipients of these awards. The Soldiers will carry throughout their careers the distinction and recognition of being the Engineer Branch's best and brightest Soldiers and leaders. Following are the results of the 2007 selection boards for the Itschner and Outstanding Engineer Platoon Leader (Grizzly) Awards, the Sturgis Medal, and the Van Autreve Award:

Active Army

Itschner Award: United States Army Pacific (USARPAC) nominee, 66th Engineer Company, Stryker Brigade Combat Team, 25th Infantry Division, Schofield Barracks, Hawaii.

Outstanding Engineer Platoon Leader (Grizzly) Award: United States Army Forces Command (FORSCOM) nominee, First Lieutenant Celio Biering, Bravo Company, 864th Engineer Battalion (Heavy), Fort Lewis, Washington.

Sturgis Medal: United States Army Europe (USAREUR) nominee, Sergeant First Class Travis Crow, Alpha Company, 173d Special Troops Battalion, Bamberg, Germany.

Van Autreve Award: USARPAC nominee, Specialist Christopher Slack, Alpha Company, 3d Brigade Special Troops Battalion, 25th Infantry Division, Schofield Barracks, Hawaii.

United States Army Reserve

Itschner Award: No nomination.

Outstanding Engineer Platoon Leader (Grizzly) Award: No nomination.

Sturgis Medal: Sergeant First Class Martin G. Durst, 401st Engineer Company (Multirole Bridge), 489th Engineer Battalion, Oklahoma Army Reserves, Enid, Oklahoma.

Van Autreve Award: No nomination.

Army National Guard

Itschner Award: 133d Engineer Company, 94th Troop Command, Wyoming Army National Guard, Laramie, Wyoming.

Outstanding Engineer Platoon Leader (Grizzly): First Lieutenant Todd D. Hotard, 225th Engineer Brigade, Louisiana Army National Guard, Pineville, Louisiana.

Sturgis Medal: Staff Sergeant Richard R. Hofstad, 1st Combined Arms Battalion, Minnesota Army National Guard, Brainerd, Minnesota.

Van Autreve Award: No nomination.

All of the nominees represented their major commands with the highest professionalism and dedication to the Engineer Corps's vision and deserve our highest praise. The award recipients were recognized on 8 May at ENFORCE 2008 at Fort Leonard Wood, Missouri.

Only the Innovative Need Apply— Brigade Special Troops Battalion Command

By Lieutenant Colonel Scott C. Johnson

One of the most unique and challenging battalion commands in the Army is the brigade special troops battalion (BSTB). Unlike most commands, the BSTB is composed of a variety of units with vastly different primary missions and branch-specific equipment and capabilities. The Army would be hard-pressed to find officers with the background to fully understand how to effectively train and employ engineer, military intelligence, signal, chemical, and military police assets.

Due to the diversity of the battalion, every commander will struggle with establishing teamwork and mission-focus within the BSTB, but it is absolutely critical to success. Whether you call it a vision or the overarching mission of the BSTB, the commander must ensure that every Soldier in the unit understands that the primary mission of the battalion is to provide enablers that enhance the brigade's ability to successfully plan, prepare, and execute operations. Success requires teamwork and a single-minded focus on enabling the brigade's mission.

The leaders and Soldiers in the battalion must be prepared to support the brigade when and where they are needed. The BSTB's responsibilities, in many cases, span the entire brigade combat team (BCT) area of operations. To achieve success, leaders at all levels must be adaptable, and the subordinate units must understand both their primary mission and the specified missions of the battalion.

The primary mission of the BSTB is to provide command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) support to the brigade with its organic assets and to execute other sustainment and support missions for the brigade, the brigade headquarters, and other supported units. The latter can include engineer units, civil affairs teams, psychological operations

1-3 Brigade Special Troops Battalion,
1st Brigade Combat Team, 3d Infantry Division,
October 2006

(PSYOPS) teams, elements of the joint forces, and any other unit augmenting the brigade or the brigade headquarters.

The specified or overarching mission of the BSTB during combat can vary based on the brigade's requirements. As a command and control headquarters, the BSTB's primary focus must remain on providing support to the brigade, but it also has the ability to command and control a functional mission or, with some inherent limitations, area of operations. The specified missions for BSTBs have varied greatly over the last few years.

Many of the BSTBs had excess engineer officers and noncommissioned officers (NCOs) when they were formed. As a result, many were assigned missions associated with engineer operations in support of the BCT—civil or military. During recent deployments to support Operation Iraqi Freedom, BSTBs have been responsible for functional area missions in support of the BCT, such as Iraqi army military transition teams (MiTTs), Iraqi police transition teams (PTTs), and civil-military operations. They have also been given the mission to execute base camp operations and security.

Another unique aspect to some, but not all, BSTBs is the control of the BCT headquarters company. In some BCTs, the headquarters and headquarters company (HHC) BCT is a completely separate organization, and in others it is task-organized under the BSTB. When the HHC BCT is organized under the BSTB, a common understanding between the deputy commanding officer/executive officer (DCO/XO) and the BSTB must be established to ensure that everyone is working toward a common goal.

An effective technique in this case is to develop a memorandum of agreement that separates and assigns responsibilities for individual training and readiness requirements, company logistics and administration, and BCT staff functions, management, and training. The BCT staff is the purview of the BCT DCO/XO, and training, maintenance, and sustainment are command issues that the BCT staff must support. Success is predicated on mutual understanding and a company commander who can bridge the gap between the battalion and the brigade staff's requirements.

During combat operations, the integration of BSTB resources with the BCT staff has the potential to blur the lines of command. The brigade engineer, intelligence, and communications staff sections are responsible for planning and coordinating support for the brigade. Elements from signal and military intelligence companies enable the brigade staff to plan, manage, and coordinate intelligence collection and analysis and communication network management. The BSTB, however, is responsible for mission preparation and execution.

Successful execution is predicated on establishing the boundaries between the brigade staff and the BSTB. To ensure common understanding and situational awareness, missions for the company's resources must flow through the BCT operations and training (S3) section via the orders process. Direct coordination between the company and the BCT staff should be allowed and encouraged, but additional coordination with the battalion and tasking authority must remain in command channels.

Tactical Unmanned Aircraft Systems (TUAS) operations provide a good example of how this process can work. The BCT intelligence (S2) section publishes the intelligence, surveillance, and reconnaissance (ISR) matrix in coordination with the units requiring support. The initial ISR matrix should be published in a BCT fragmentary order (FRAGO) and in a BSTB FRAGO in an adequate amount of time to allow for planning at all levels. The military intelligence company has the ability to conduct parallel planning through the BCT FRAGO (essentially a warning order). Any technical or crew rest issues are worked out between the BSTB and the BCT S2 before the BSTB issues its order.

All the mission planning and preparation to successfully execute TUAS operations is the responsibility of the military intelligence company and the BSTB. Once the TUAS is airborne, tactical control of the aircraft may revert to the

> ***"At any time, these Soldiers must understand the capabilities of both their own companies and the mission and functions of the battalion as a whole."***

supported unit and the brigade. A TUAS liaison officer can synchronize targets, in-flight diversions, and time on station in coordination with the BCT S2 and S3 battle captains directly. By operating in this manner, both the military intelligence company and the BSTB can monitor execution while providing maximum flexibility. When the TUAS returns to base or lands, full control of the asset again returns to the military intelligence company and the BSTB.

This cooperative process should also apply to other assets in the military intelligence company, the signal company, and the chemical and military police platoons when they are supporting brigade operations. Depending on the missions the chemical and military police platoons are assigned, it is possible to keep all coordination and planning at the battalion level. When these units aren't engaged directly in the brigade fight, the BSTB has the ability to employ these units in support of the battalion's other missions or to enhance the battalion's execution of other support and security functions.

Regardless of the mission, the BSTB must have well-disciplined and trained Soldiers and adaptable leaders to achieve success. Individual training within the BSTB companies and the HHC BCT (if attached) must focus on individual expertise—both as a Warrior and in their specialty. The goal, as in any command, is to produce Soldiers skilled in the Warrior Tasks and Battle Drills and imbued with the Warrior Ethos. The signal, military intelligence, engineer, military police, chemical, infantry, and other Soldiers must also be highly proficient in their military occupational specialty (MOS)-specific skills at the individual and collective levels.

Training Soldiers on Warrior Tasks and Battle Drills is fairly straightforward. In the BSTB, training Soldiers, teams, sections, platoons, and companies is as complex and diverse as the organization and missions they are expected to perform. Developing, resourcing, and executing a training plan that creates experts in the broad range of specialties requires leaders who fully understand the mission of their unit and the training resources available to them. Training is available at the installation, through the various schoolhouses, from the Department of Defense and other outside agencies, from civilian technical institutions, and through other accredited venues. Leaders within the BSTB must be innovative in searching out training opportunities and resources for their Soldiers to ensure that they have the skills and tools to succeed.

The officers and NCO leaders within the BSTB must be adaptable and multifunctional. Officers from multiple branches and NCOs with a broad spectrum of MOSs fill the ranks of the BSTB. At any time, these Soldiers must understand the capabilities of both their own companies and the mission and functions of the battalion as a whole. This will enable the companies and units within the BSTB to achieve a certain synergy that enhances the overall effectiveness of the battalion and enable leaders to develop techniques to enhance the mutual support required to ensure their success.

As with any organization, it is a challenge to develop adaptable and innovative leaders, but the BSTB absolutely requires them. It requires a constant top-driven focus on how the unit and its diverse elements can improve their effectiveness and efficiency. It requires problem solvers who can develop solutions with limited resources. It requires a team mentality among the officers in the battalion and teamwork between what have historically been stovepipe organizations. It requires leaders to encourage and nurture junior leaders and Soldiers to develop workable solutions and implement them.

Commanders, staff officers, and senior NCOs assigned to the BSTB must be willing to expand their experience base, learn a variety of new skills and technical knowledge, and grow both professionally and personally. The success of the Army's BCTs requires dedicated and innovative leaders who are focused on achieving results. When approached with an open mind and willingness to place the mission of the brigade first, BSTB command is a personally and professionally rewarding experience that demands the best.

Lieutenant Colonel Johnson, United States Army Corps of Engineers, commanded the 1-3 Brigade Special Troops Battalion, 1st Brigade Combat Team, 3d Infantry Division, from 20 June 2006 to 17 June 2008. He is currently assigned as the United States Army Engineer School Chief of Staff.

4TH ANNUAL BEST SAPPER COMPETITION

By First Lieutenant James Butler

From 6 through 8 May, the best sappers from across the Regiment converged at Fort Leonard Wood for the 4th Annual Best Sapper Competition. Hosted by the 577th Engineer Battalion and Sapper Leader Course personnel—and sponsored by the Engineer Regiment—the competition gave engineer units across the Army the opportunity to showcase their best Soldiers. The six-phase competition was to determine the best of the best. The Soldiers who stood out here are the best in their units, the best in the Regiment, and some of the best in the Army.

Best Sapper 2008

This year's competition, which was attended by 25 teams from 19 units across the Army, included ranks from private first class through major. The six major events were—

- Phase I: Nonstandard Physical Fitness Test (NSPFT)
- Phase II: Round-Robin
- Phase III: X-Mile Road March
- Phase IV: Sapper Stakes
- Phase V: Land Navigation
- Phase VI: X-Mile Run

Day One

Phase I—the NSPFT—set the tone for the rest of the competition, determining who was ready and who wasn't. The NSPFT consisted of 5 minutes of push-ups, 5 minutes of sit-ups, and 3 minutes of pull-ups. Only one member of a two-man team could perform each exercise at a time, but team members could switch throughout the designated time period. The intent was to throw a little strategy into the test. This made the teams think a little more about the event as it progressed. It also added an extra edge of competitiveness to the event. The NSPFT ended with a 3-mile run in interceptor body armor (IBA) and small arms protective insert (SAPI) plates.

After the NSPFT, competitors moved to Phase II—the Round-Robin—with the first subevent being a 150-meter swim with a poncho raft. As the 24 teams exited the water from the poncho raft swim (1 team had dropped out due to an injury), competitors were loaded on trucks again and sent to six different sites on Fort Leonard Wood to continue the event. The additional subevents for the Round-Robin included the stress shoot, grenade range, timber-cutting charge, counterforce charge, military operations on urbanized terrain (MOUT) breach, and urban challenge. The urban challenge, a new subevent this year, tested competitors' ability to shoot, move, and communicate through a simulated Iraqi village that consisted of realistic battle sounds, opposing forces (OPFOR) in traditional clothing, artillery simulators, and burn barrels, as well as live animals.

Photo by Multimedia Visual Information Service Center

A team from 20th Engineer Brigade conducts the buddy rappel as part of the Best Sapper Competition. The buddy rappel was part of the Day Two events on 7 May.

2008 Best Sapper Competition Teams

2LT Jonathan Browning SGT Jack Ramthun	20th Engineer Battalion Fort Hood, Texas
SGT Alexander Mack SGT Glenn Taylor	20th Engineer Battalion Fort Hood, Texas
SGT Justin Gaiser SPC Patrick Hernandez	20th Engineer Battalion Fort Hood, Texas
1LT Douglas Droesch 1LT Kyle Metzger	1st Engineer Battalion Fort Riley, Kansas
SSG Karen Antonyan SGT Matthew Rowsey	911th Engineer Company Fort Belvoir, Virginia
1LT Scott Sann SSG Travis Kaufman	U.S. Army Dive Company Fort Eustis, Virginia
CPT Jason Winkelmann 2LT Joel Groves	8th Engineer Battalion Fort Hood, Texas
SGT Rory Leslie SGT Kurt Nuhfer	37th Engineer Battalion Fort Bragg, North Carolina
1LT Scott Eshom 1LT Nicholas Soroka	502d Engineer Company Hanau, Germany
1LT Nicholas Fox 1LT Kyle Moore	11th Engineer Company Fort Riley, Kansas
2LT Zachary Taron 1LT Matthew Davis	3d Brigade Special Troops Battalion Schofield Barracks, Hawaii
CPT Christopher George CPT Josh Eggar	554th Engineer Battalion Fort Leonard Wood, Missouri
MAJ Stephen Peterson CPT Daniel Taphorn	1st Engineer Brigade Fort Leonard Wood, Missouri
SSG Michael Daley PFC Ryan Morison	562d Engineer Company Fort Lewis, Washington
1LT Christopher Clare 1LT Tyrel Keplinger	4th Engineer Battalion Fort Carson, Colorado
1LT Kristopher Valenti PFC James Conley	4th Engineer Battalion Fort Carson, Colorado
1LT Brian Burch 2LT Richard Miller	511th Engineer Company Fort Campbell, Kentucky
1LT Matthew Textor SGT Dustin Hughes	65th Engineer Battalion Schofield Barracks, Hawaii
SFC Michael Behnkendorf 1LT Shawn Hogan	20th Engineer Brigade Fort Bragg, North Carolina
SSG Timothy Knight SGT Joshua Morgan	2-8 Cavalry Division, 1BCT Fort Hood, Texas
1LT Nathan Magee 2LT Kevin Kirby	562d Engineer Company Fort Lewis, Washington
2LT Chris Williammee SPC James Wiard	72d Engineer Company Fort Riley, Kansas
1LT Lucas Hansen SPC Chris Gomez	72d Engineer Company Fort Riley, Kansas
2LT John Davis SSG Keith Novembre	562d Engineer Company Fort Lewis, Washington
1LT Craig Genung SGT Justin Claypool	591st Engineer Company Fort Campbell, Kentucky

2008 Best Sapper Competition Winners

First Place	CPT Jason Winkelmann 2LT Joel Groves	8th Engineer Battalion Fort Hood, Texas
Second Place	SFC Michael Behnkendorf 1LT Shawn Hogan	20th Engineer Brigade Fort Bragg, North Carolina
Third Place	MAJ Stephen Peterson CPT Daniel Taphorn	1st Engineer Brigade Fort Leonard Wood, Missouri

Scoring for the individual events was designed so that no one event could outweigh any other. That was done so a team wouldn't completely knock themselves out of the competition by doing poorly at one event. The idea was to look at the total Soldier, the most well-rounded sappers.

Day Two

At 0200, the 24 teams began Phase III—the X-Mile Road March. Designated the "X-Mile" because competitors were not told the total distance, the road march served as another hurdle in the competition to set the best sappers apart from their competitors. By the end of the road march, 5 teams had dropped from contention.

At 0730, the remaining 19 teams loaded trucks for their dropoff at the Sapper Stakes (Phase IV) events, which would add 5 more miles to the 16 the teams had already covered. The subevents that made up Sapper Stakes were the weapons assembly, foreign mine identification and improvised explosive device (IED) report, combat lifesaver (CLS) techniques, inert steel cutting, knot tying, Prusik climb and buddy rappel, mine detectors, and the obstacle course and physical endurance course (PEC). Throughout Sapper Stakes, teams moved on foot to each event to total 5 miles.

The biggest subevent of the phase is the Prusik climb and buddy rappel. However, due to safety concerns caused by lightning, this subevent—as well as the obstacle course and

Photo by Multimedia Visual Information Service Center

The 554th Engineer Battalion team assembles the M9, M16, M240, M249, and AK-47 weapons.

PEC course—had to be removed from the competition. With heavy lightning in the area, it was too risky for Soldiers to conduct rappels on the 45-foor Sapper Tower.

At 2100, the remaining 18 teams began Phase V—the Land Navigation Course. The event added another 6 miles to the 21 miles the teams had already covered and took them right up to 1 hour before the X-Mile Run of Day Three. By the completion of the land navigation course, another team had dropped out.

Day Three

Phase VI of the competition was the X-Mile Run, and only the top 10 teams advanced to this phase. Before starting the run, the competitors were unaware of the total distance or the mystery events on the route. The mystery events this year included carrying items weighing up to 110 pounds for various portions of the 9-mile run. By the completion of the event, the teams would have covered a total of 32 miles during the competition.

Best Sapper 2009

Overall, the three-day event set the standard for the Best Sapper competitions in the future. This year's competition was considered to be the best one yet; and since it was tied in with ENFORCE, it had a lot more visibility than it had in the past. The 2009 competition is expected to be even better. The Sapper Leader Course cadre are already assessing the 2008 competition and beginning to plan for next year. Although they expect to use some of the same types of events in 2009, they will definitely make some changes to continue to challenge the competitors. The cadre encourage teams to begin preparing now and register as early as possible to make the cut for next year's competition.

First Lieutenant Butler is the executive officer of Headquarters and Headquarters Company, 577th Engineer Battalion, Fort Leonard Wood, Missouri. Commissioned through the Army Reserve Officer Training Corps, he is a graduate of the Sapper Leader Course at Fort Leonard Wood and the Ranger School at Fort Benning, Georgia.

Photo by Multimedia Visual Information Service Center

A Sapper cadre member inspects knots tied by a Soldier from the 1st Engineer Brigade team.

Combat Outpost Construction in Afghanistan's Paktika Province

By Captain Nicholas O. Melin

A key tenet of successful counterinsurgency operations is the separation of the enemy from the local population. If insurgents are present in remote towns and villages, efforts to foster economic progress or build a representative government are consistently undermined. With space to operate, however, the local population can receive benefits from reconstruction, and the environment can be transformed to the point where insurgents can no longer find safe haven or sympathy.

Across Afghanistan in 2007, North Atlantic Treaty Organization (NATO) Soldiers pushed out into insurgent safe havens, lived among the local population, and worked to create space for reforms to occur. Nowhere was this process more challenging and critical than on the rugged Afghanistan–Pakistan border. Mountainous terrain, a porous border, and safe havens combined to create an environment where insurgents enjoyed freedom of maneuver within a few kilometers of the border. From this area, rocket attacks were launched at coalition bases, and villages were either abandoned or forced to support insurgent forces. Freedom of movement across the Pakistan border facilitated the supply and support of insurgent cells throughout eastern

HESCO Bastion Concertainer wall

and central Afghanistan, and the movement of groups of insurgents through critical mountain passes was not uncommon. The insurgents attempted to evade coalition patrols and move to safe havens and facilities hundreds of kilometers inside Afghanistan.

Mission

Team Bulldog from Bravo Company, 864th Engineer Battalion (Combat) (Heavy), out of Fort Lewis, Washington, received the mission to construct multiple combat outposts (COPs) near the Afghanistan–Pakistan border. The purpose of these bases was to interdict insurgent movement and separate the insurgents from local villages in the border region and larger population centers within Afghanistan. Partnered with the maneuver task force in the area—Task Force Eagle, 1-503d Parachute Infantry Regiment of the 173d Airborne Brigade Combat Team—Team Bulldog constructed three COPs during combined arms military operations. These COPs allow coalition forces in Paktika Province to control key insurgent avenues of movement and to interact more closely with the local population. An examination of the tactics, techniques, and procedures (TTP) used during one COP construction project reveals how combat heavy engineer units can integrate with maneuver forces and enhance their capabilities in austere areas of operation.

A Soldier from Bravo Company, 864th Engineer Battalion, Fort Lewis, Washington, nails the wall for a bunker at an outpost on an Afghanistan mountain.

Planning and Preparation

In early July 2007, Task Force Pacemaker (864th Engineer Battalion) tasked Bravo Company to partner with Task Force Eagle in eastern Paktika Province on a plan to construct a COP between a key forward operating base (FOB) and the Pakistan border. Increasing rocket attacks on the FOB from the border region, as well as a number of border villages with interests in economic programs, made coalition presence near the border essential. Task Force Eagle planned to conduct a combined arms operation along the border, providing sufficient security to execute construction operations. Given the enemy threat in the area, the initial occupancy construction for the COP had to be completed within the mission's two-week time limit.

Team Bulldog was task-organized as a combined joint team, with infantry Soldiers to augment security at the construction site and Afghan National Army (ANA) engineers to work as full partners on the project. Planning for the operation began with Team Bulldog's attached survey team conducting an initial design—based on information provided by the maneuver task force—to order materials. Given the lag time for ordering and moving materials from the logistical support areas to an FOB, it was essential to start the process as quickly as possible. Also, early designs were executed through daily coordination and discussion with the maneuver task force, ensuring that the guard towers, living areas, and walls were designed to their specifications. At the same time, the construction officer in charge made estimates of the contracted equipment and labor support required to finish construction within the mission's time limit. Augmenting military construction equipment with local equipment and local workers increased the amount of work accomplished per day and prevented delays due to the breakdown of equipment.

Since the location for the COP was at the top of a 2,400-foot ridgeline covered with trees, it was necessary to conduct a topographic survey to determine the amount of usable area available and the amount of work that would be required to clear the ridge of vegetation. Despite being ambushed by insurgents with small arms and rocket-propelled grenades during the survey, the necessary information was collected. It was determined that the shape of the COP, initially designed as a triangle, would have to be adjusted to fit the constraints of the land. It would take at least two days to clear the ridgeline and shape the terrain to reduce the slope inside the COP to less than 5 percent.

Upon completion of the survey, the full scope of work was developed:

- Construct a combat trail from FOB Bermel—another facility in the eastern part of Paktika Province—to the COP.
- Clear the hilltop of trees in order to provide space for construction and fields of fire.
- Erect HESCO Bastion Concertainer® walls.
- Place a concertina wire perimeter with fields of fire cleared.
- Construct guard towers.
- Construct vehicle and living facilities.
- Construct weapons facilities.
- Construct helicopter landing facilities.

Throughout the last week of July, final preparations for movement on the mission began at FOB Orgun-E, outside the town of Orgune. To ensure that all required materials were on hand for each day of the construction plan, CONEX shipping containers were packed by day with the required materials. The small size of the site necessitated staggered deliveries of construction materials. Additionally, lumber was precut and facilities were prefabricated wherever possible to speed on-site construction.

On 1 August, the construction team began continuous route construction from FOB Bermel toward the COP construction site. Since maneuver elements were already positioned forward of the construction site, it was determined that moving most of the construction element was tactically sound. The route for the road to get to the construction site had to be cleared of trees, reshaped, and widened. Upon arrival at the construction site, tree-clearing and ground-shaping operations began as ANA engineers staged workers and construction materials at the base of the ridge. The infantry platoon also began preparing fighting positions at key points surrounding the construction site.

Construction started with clearing trees from the COP site, placing concertina wire, grading and leveling the site, and constructing the HESCO wall. Integration of local national contractors in the project made it necessary to search and secure local workers and conduct multiple logistical convoys to support their equipment and to move construction materials. The role of construction surveyors on-site was essential since constructing flat pads for guard towers and living areas on a site that sloped in two different directions was a significant challenge. To ensure that the interior of the COP could not be observed from nearby hilltops, it was determined that a portion of the site would have to be raised and stabilized with a HESCO retaining wall before construction of the main wall. Next, guard towers were constructed, after consulting with the maneuver commander who would take control of the COP. Construction of weapons facilities, vehicle facilities, and barracks areas and electrical wiring of the base all occurred during the last phase of the project.

Completing the entire project within the time limit necessitated multiple logistics packages (LOGPACs), as well as an aggressive security plan. Team Bulldog's attached infantry platoon led more than 20 LOGPAC convoys during the mission, shuttling materials and repair parts to the construction site. The attached infantry and ANA platoons also conducted dismounted patrols in the area of the jobsite. Security measures were necessary because insurgents launched three rocket and mortar attacks on the construction site during the mission, and one LOGPAC convoy was attacked with an improvised explosive device (IED). Despite these obstacles, Team Bulldog successfully completed the COP and returned to FOB Bermel.

A Soldier places a concertina wire perimeter.

Lessons Learned

During the construction of the one of the COPs, Team Bulldog developed a number of TTP that may be useful to units tasked to construct COPs in austere locations:

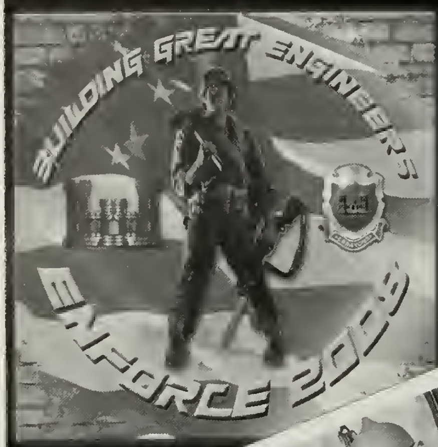
Engineers from Bravo Company, 864th Engineer Battalion, Fort Lewis, Washington, put up wall structures for a new bunker that will serve as an outpost in the middle of the mountains in eastern Afghanistan.

- Integrate early with the maneuver task force for planning the combined arms mission in order to identify logistical and security requirements, as well as control expectations for the construction effort.
- Initiate the design and material estimate for the project as soon as possible, checking all plans with the customer. Procuring materials and funding for large construction projects takes deliberate effort months before execution.
- Verify fields of fire for all guard towers before construction. Determine tactical requirements that impact the design process.
- Conduct a full topographic survey, if possible. This will reveal construction issues before movement is initiated.
- Ensure that surveyors are on-site during construction to resolve construction issues.
- Precut and pack materials by the day of construction to avoid having to sort materials on-site.
- Augment military equipment and labor with civilian equipment. Military equipment is required because civilian equipment can be unreliable if used exclusively. However, use of civilian equipment to accelerate production is necessary when executing missions with fixed suspense dates.
- Inspect all civilian equipment a week before movement to allow time for repairs. Planning for civilian contractor integration into a combined arms mission must be deliberate and thorough to ensure that contractor delays do not affect mission accomplishment. Operations security requirements must also be considered.

Enduring Effects

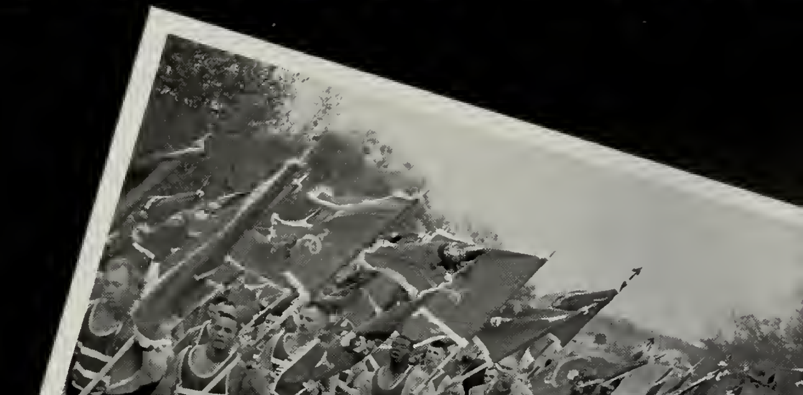
The COP construction mission described in this article demonstrated that maneuver units can integrate construction engineer effects into their operational plan as part of a counterinsurgency campaign. If properly planned and synchronized with the maneuver task force, construction engineers can leverage their unique capabilities as a part of the counterinsurgency fight. A forward-positioned COP along the Pakistan border led to an immediate disruption of insurgent activity in the local area and caused a dramatic decrease in insurgent activity in the vicinity of FOB Bermel. With the ability to directly observe and control the border, Task Force Eagle made strides in separating the enemy from the local population. These effects were made possible by the efforts of combat heavy engineers.

Captain Melin is the commander of Bravo Company, 864th Engineer Battalion, which deployed as part of Task Force Pacemaker. He previously served as civil engineer and assistant operations officer for Task Force Pacemaker. He is a graduate of the United States Military Academy at West Point, New York.



ENFORCE 2008

Best Sapper Competition winners

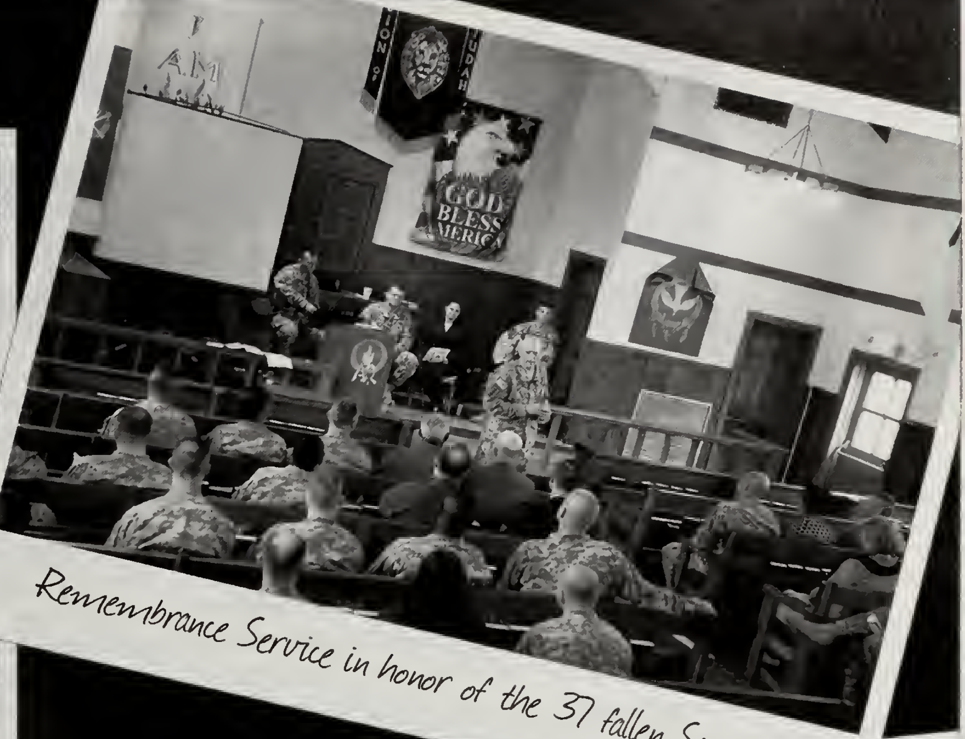

Regimental Spirit Run

Chief of Engineers State of the Regiment Addres

Gold DeFleury Medal recipient
LTG (Ret) Robert Flowers

St. Louis, Missouri

Industry Partners demonstration



Remembrance Service in honor of the 37 fallen Sappers

Engineer Regimental Ball

oring Regimental CSM Clint Pearson

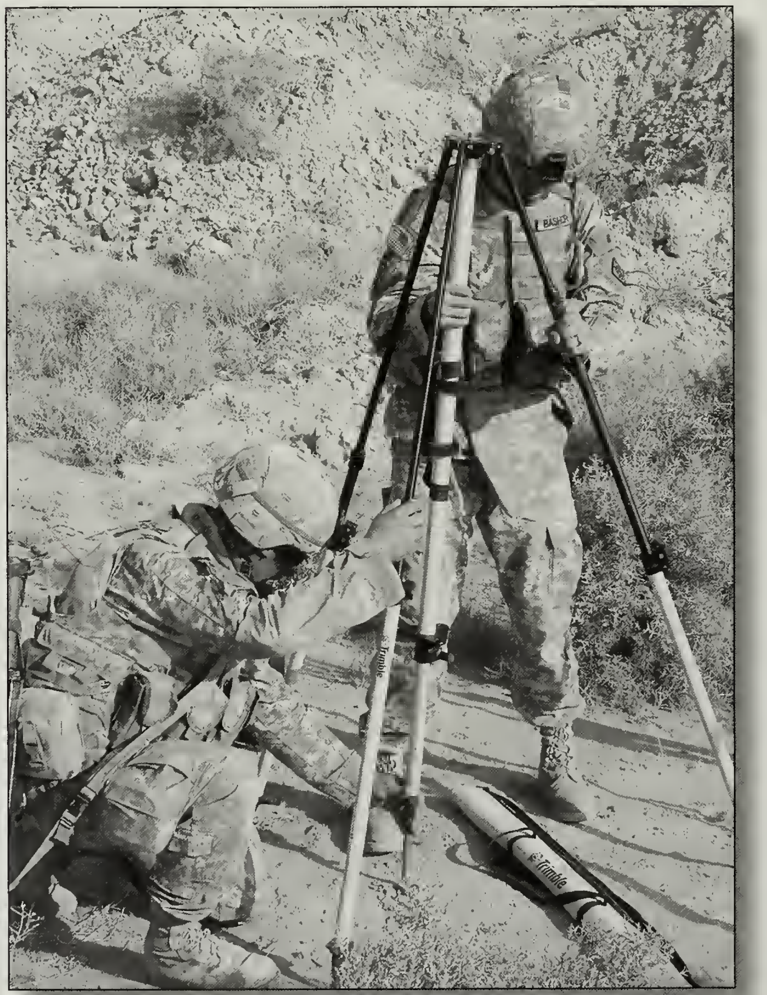
Design by Jennifer Morgan

Photos by Multimedia Visual Information Service Center
Fort Leonard Wood, Missouri

Field Force and Facility Engineer Training

By Major Erik C. Backus

Today's counterinsurgency (COIN) operations require engineer leaders to have knowledge of both the lethal and nonlethal effects that can be used on the battlefield. In Iraq and Afghanistan, engineer officers and noncommissioned officers are being asked to provide technical expertise some of them are ill-equipped to give based on the engineering educations they have received through the Officer Education System (OES) and Noncommissioned Officer Education System (NCOES), not to mention the nonengineering-related civilian-source degrees they possess. Conjuring up a bill of materials (BOM), writing a concise yet complete and understandable scope or statement of work (SOW) for construction, and pushing the requests of the maneuver commander through the contracting and tasking processes are skills our leaders need to improve. This kind of training needs to be inserted immediately.



Personnel from the 243d Construction Management Team set up a surveying beacon near Patrol Base Dragon in Iraq.

Further, engineer leaders at all levels are being asked to provide oversight and assistance for the life support of our Soldiers through base camp and life support construction. The mission of quickly establishing and maintaining safe and secure contingency operating locations of all sizes is a task that is dumped into the engineer's lap in our current contingency operation. Facilities engineering skills—to include environmental assessments, master planning, life-cycle costing, and maintenance oversight—are skills that have not been stressed in our professional force. Because of the overwhelming use of and need for these skills as we continue the War on Terrorism, the United States Army Engineer School (USAES) should develop a cell that can ensure the development and maintenance of certain core competencies that our engineer leaders need to meet the challenges of this war.

Core Competencies for the Future

Five core engineer competencies for the required future of COIN operations, based on lessons learned in the War on Terrorism, are—

- Construction project development.
- Contracting and funding.
- Field force engineering.
- Facility engineer planning.
- Executing the total quality management process.

Each of these has unique attributes that must be considered in the implementation of any future training program.

Construction Project Development

Construction project development consists of three primary elements that every engineer needs to be able to perform:

- ***Project scoping.*** Our engineers must be able to site-adapt a pre-engineered design, develop limited independent contingency designs, write indigenously understandable construction specifications, and write a clear and concise SOW.

- ***Project estimation.*** Our engineers must be able to develop reasonable project schedules using either government or commercial software, do construction plan and specification take-offs in order to develop a BOM, and develop an order-of-magnitude estimate with the application of estimating tools and sources.
- ***Project package development.*** Our engineers must be able to compile the SOW, drawings, and specifications; review documents to ensure that they meet required life-safety, regulatory, and code provisions; and gain the applicable endorsements and buy-ins through the staff process.

All of these skills are required on and off the forward operating base (FOB) in order to provide the maneuver commander with an effective way to shape the terrain by developing well-planned and well-executed construction projects.

Contracting and Funding

Contracting and funding requires an understanding of both these separate yet interrelated processes. The contracting process includes—

- Coordination with the applicable contracting agency.
- An understanding of the roles and responsibilities of the contracting officer (KO), the contracting officer's representative (COR), and the contracting officer's technical representative (COTR).
- Bid selection processes and rules.
- Construction contract administration.

The funding process includes—

- An understanding of construction fiscal law and limitations.
- An understanding of contingency funding processes such as the Joint Facilities Utilization Board, Joint Acquisition Review Board, Logistics Civil Augmentation Program, and military construction.
- The development of funding packets.

While easy to describe, this skill set is enormous in its implications on the battlefield. Without it, our engineers can quickly become stymied in their ability to make their project packages achieve the results intended.

Field Force Engineering

Field force engineering (FFE) links engineer components to provide a seamless capability. Its elements center on—

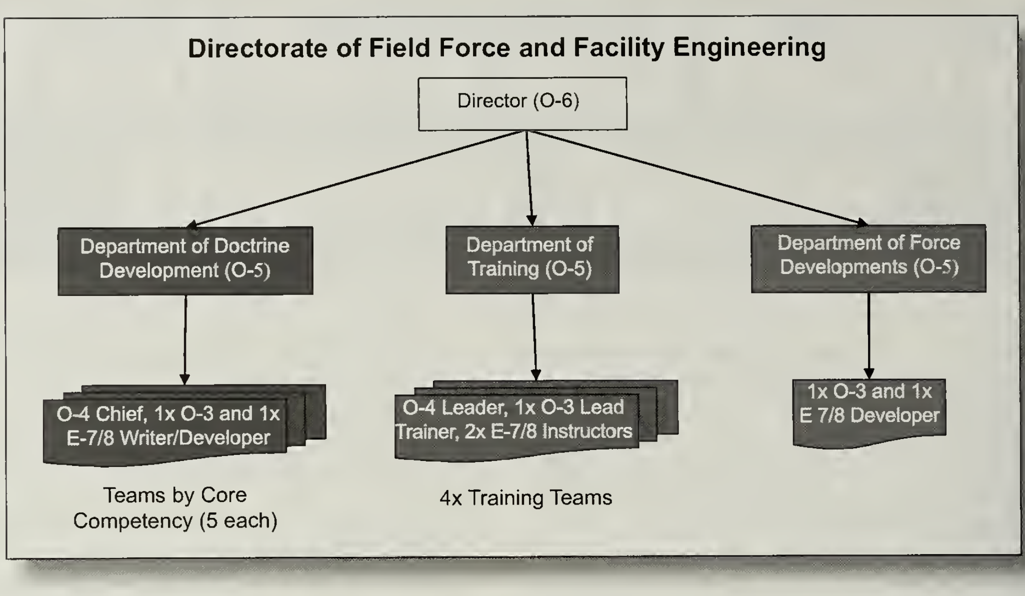
- ***Force protection.*** Engineers have much to do with developing appropriate force protection elements, including—
    - ☐ Development and enforcement of antiterrorism and security engineering criteria, including their integration into project design.
    - ☐ Execution of indirect-fire mitigation and risk analysis.
    - ☐ Fostering an understanding of the relationship between base-centered force protection and lethal operations.
- ***Life support.*** Providing life support takes the form of—
    - ☐ Facility development and facility program requirement identification.
    - ☐ Development of, and connections to, necessary systems such as electricity, sanitation, water, and solid waste disposal.
    - ☐ Critical analysis of programming requirements and regulations on life support.
- ***Infrastructure.*** Engineers play a large role in any facility's infrastructure, including—
    - ☐ Development of base and localized infrastructure systems.
    - ☐ Coordination with local support structures.
    - ☐ Maintenance and crisis-resolution planning.
- ***Life, health, and fire safety.*** It is critical that engineers understand life, health, and fire safety requirements, including—
    - ☐ Code compliance, egress, and inspections.
    - ☐ Prioritization of efforts.
    - ☐ Building siting and dig permit/safety program development.
    - ☐ Construction site safety marking and safety plan implementation.

"Protect the force" has been rendered on many a mission-essential task list by unit commanders, but it is critical that we empower engineer leaders with the skills listed above to enable that protection to happen.

Facility Engineer Planning

To execute the long-term engineer fight, our leaders need to be educated in master planning, facility management, and operational planning and have an understanding of economic battlefield effects.

- Master planning involves—
    - ☐ Long-range facility planning.
    - ☐ Base alignment (opening and closure).
    - ☐ Facility requirement identification.
- Facility management/operational planning include—
    - ☐ Supporting the maneuver commander by planning for pre-positioned BOM.
    - ☐ Assisting with operations and maintenance takeover.
    - ☐ Transitioning to Installation Management Authority/Department of Public Works control of installations.


Directorate of Field Force and Facility Engineering
Director (O-6)
Department of Doctrine Development (O-5)
Department of Training (O-5)
Department of Force Developments (O-5)
O-4 Chief, 1x O-3 and 1x E-7/8 Writer/Developer
O-4 Leader, 1x O-3 Lead Trainer, 2x E-7/8 Instructors
1x O-3 and 1x E 7/8 Developer
Teams by Core Competency (5 each)
4x Training Teams

- Economic battlefield effects include—
  - ☐ Local Commander's Emergency Response Program (CERP) efforts.
  - ☐ Installation effects on the local economy.
  - ☐ Development of micro-industries and employment as a part of COIN.

Engineers have a key piece in the nonlethal fight and can use these planning skills to provide the combatant commander with much more bang for his buck.

Total Quality Management Processes

Mastery of total quality management processes includes an understanding of—

- ***Quality assurance (QA) and quality control (QC) systems.*** QA/QC education must teach leaders to integrate QC into all projects, develop a QA program with planned oversight, and develop corrective action plans in case quality does not meet standards.
- ***Project tracking and work order system management.*** Project tracking and work order system management needs leaders who can execute database management, use geographical imaging software, and provide real property management. This last skill set not only ensures that the commander gets what he wants; it ensures that he doesn't get a lemon.

Future Education Leader

The Facility Engineer Group (FEG), the headquarters for facility engineer detachments and teams, is transitioning and preparing to hand over its functions to the 412th and 416th Theater Engineer Commands. Up until now, the skill sets and core competencies listed in the previous paragraphs have resided within the personnel and organization of the FEG. With its loss, some organization is needed to ensure that the education systems of tomorrow integrate these skill sets and core competencies and ensure their development during practical assignments. Ultimately, USAES must be the education leader with an organization such as a Directorate of Field Force and Facility Engineering (see figure above) to apply these skills to practical Army challenges, followed by developmental assignments that enable leaders to refine these skills and gain invaluable experience. I recommend that this directorate include departments of doctrine development, training, and force developments. With this structure, and the integration of training in the above core competencies into our engineer OES and NCOES, this directorate could enable the collection and dissemination of the knowledge engineer leaders will need to win the construction and facility engineer fight for the future.

Hard lessons learned in Afghanistan and Iraq have taught us to change our tactics and remember some lost lessons learned. The COIN fight in Iraq requires that today's engineer leaders equip tomorrow's engineer leaders with the skills to provide world-class military engineering capability to combatant commanders in the contemporary operating environment. These core competencies are even more important as we continue to engage in environments like the Middle East, where political and economic operations are the essential elements that enable us to consolidate military successes and achieve national objectives. Construction, field force, and facility engineering skills are the critical missing link to prevent failure in these kinds of operations in the future. We must act now, while we are meeting success in the breach, to ensure that we are not bogged down by the obstacles our enemies have tried to place around us.

Major Backus has served in a variety of command and staff assignments, commanding the 955th Engineer Company (Pipeline Construction), and serving in the 389th Engineer Battalion (Combat) (Heavy) in Baghdad during the first year of Operation Iraqi Freedom. He is a registered professional engineer in Missouri, currently serving as the lead design engineer for the 20th Engineer Brigade (Combat) (Airborne), deployed to Logistics Support Area Anaconda in Balad, Iraq.

Junior Officers in USACE

By Colonel Christopher W. Martin

During a deployment to the Afghanistan Engineer District, these engineers work with Afghan nationals on a project.

As a junior officer in the Army, are you contemplating whether or not a tour in a United States Army Corps of Engineers (USACE) district is the right job for you? Are you concerned that you will not receive the training you need to be a successful officer in USACE and that the likelihood of further promotions will be lessened? Maybe you are concerned that this is a sleepy job that you will not enjoy, or that working under the supervision of a civilian will impede your professional development.[1] You might even be concerned that although you are an engineer officer, you do not have adequate experience in construction or the ability to perform this job successfully. Perhaps all these things are troubling you, and although you have heard great things about working for the "Corps," you are still hesitant to talk to the Engineer Branch about assigning you to that type of job. If these things are bothering you, and you aren't sure if this is the kind of assignment you want, I hope to put your concerns to rest and assure you that a tour with a USACE district is both professionally and personally rewarding, as well as challenging. But the Army, USACE, and the officer will all benefit from the experience.

> *"A tour with a USACE district is both professionally and personally rewarding, as well as challenging."*

A job in a USACE district exposes young officers to a whole new side of the Corps of Engineers, allowing them to gain experience in construction, develop and hone negotiating skills, and develop new leadership skills. Ideally, a new officer reporting to USACE will be assigned as a project engineer to an area office on a military base as part of the military construction (MILCON) program. The construction experience a captain or major gains in the area office is invaluable. There, officers learn to read construction blueprints and inspect actual construction for conformance to required specifications, along with learning the basics of construction management. Part of the job will also likely include negotiating modifications to construction contracts with a prime contractor on the project. These same skills are required in Afghanistan and Iraq every day, not just by USACE representatives but also by units and Provincial Reconstruction Teams (PRTs).

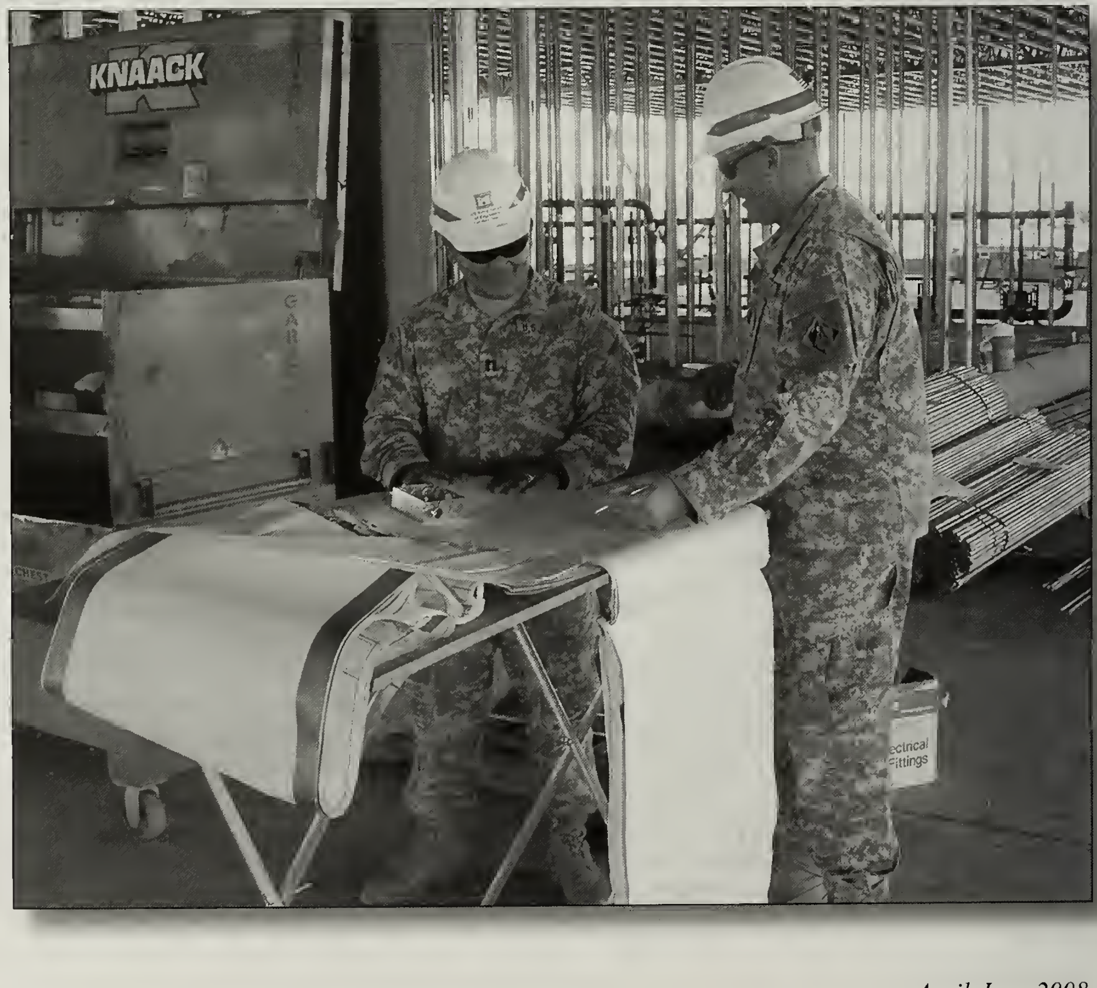
Although not normally assigned to "leadership" positions in an area office, officers still have a great opportunity to display, refine, teach, and exercise leadership skills. Not having been exposed to the civilian personnel system in previous assignments, you will have to learn how the new civilian system, known as the National Security Personnel System (NSPS), works. Regardless of your position in the area office, you are looked upon differently, both by contractors and by the Department of the Army civilians you work with. All of them expect the utmost in professionalism, honesty, discipline, and levelheadedness. USACE civilian employees are all required to be in a leadership development program when they first come on board, and you may have opportunities to talk to them about leadership. You will also likely have the opportunity to work for a civilian boss and learn that good leadership is not restricted to just military officers.

A USACE assignment is a great opportunity to continue your professional development following a deployment. You could catch up on your professional reading, progress toward a master's degree, or become licensed as a professional engineer. Everyone around you will work "civilian" time, and regardless of how hard-charging you are, at some point you realize you cannot do anything when you are the only one in the office. Weekends are generally open and available to spend time with your family.

This doesn't mean you won't deploy. Officers are needed in the Afghanistan Engineer District, as well as the Gulf Region Division, which has three districts inside Iraq. In addition, many districts maintain a Field Engineering Support Team–Advanced (FEST-A), which includes a military officer as the leader. The FEST-A's must be ready to deploy worldwide on a rotational basis and routinely deploy to the Joint Readiness Training Center (JRTC) or the National Training Center (NTC) for training with brigade combat teams (BCTs) and/or divisions as they train for, and conduct, mission rehearsal exercises. The FEST-A's are actually expanding to table of organization and equipment (TOE) units, adding a noncommissioned officer (NCO) as well as the engineer captain, and coding civilian personnel positions to be on this team beginning in fiscal year 2008. FEST-A's provide technical reachback to USACE labs and center of engineering expertise and have embedded the following skills:

- Real estate acquisition and disposal of real property
- Facilities design and development and infrastructure planning and assessments
- Environmental engineering, including baseline environmental assessments and environmental assessments of specific host nation facilities to be used by U. S. forces
- Geospatial engineering expertise and identification of groundwater sources
- Facility force protection design and infrastructure engineering/assessment
- Hardened-target weapons-effect assessments

As a battalion commander in Iraq, I often wished I had an officer or NCO with some basic understanding of construction to assist or act as our civil affairs officer and execute our construction program within our area of responsibility. I believe that having a captain with USACE district experience would have made a difference in being able to provide a good set of plans or project specifications to the Iraqi contractors we worked with, to ensure that we got the best possible project. The basic construction skills an officer acquires from overseeing a USACE MILCON project typically includes concrete placement, concrete masonry unit (CMU) construction, and electrical and plumbing installation and would have given an officer in the battalion a tremendous level of credibility in Iraq.



Engineer officers review blueprints for a project at Fort Bliss, Texas.

Military officers bring skills to the district not normally resident in our civilian teammates. For example, recently our district was tasked to develop a "strategic" plan for Customs and Border Protection of the United States Department of Homeland Security. To accomplish this mission, we brought in several of our junior officers who were able to use their military decision-making process skills and help guide our civilian teammates through the development of this plan.

Engineer officers also bring a tremendous capability to support USACE in emergency management operations within the continental United States (CONUS). When USACE is brought in to assist the Federal Emergency Management Agency (FEMA) following natural disasters (such as hurricanes and earthquakes) or terrorist actions (such as at the World Trade Center), our officers are invaluable in their ability to assist with setting up a command and control cell, help organize operations, and assist with recovery operations. In the Fort Worth Engineer District, we expect all our officers to complete the Defense Support to Civil Authorities online course offered by United States Army North (USARNORTH) to ensure that they are prepared to support USACE activities following an emergency event.

Soldiers use a nuclear densimeter to determine soil compaction and moisture content.

An area we could improve on in USACE is training our new officers when they arrive in the district. There is a one-week course, usually in December, that each new officer attends. In addition to this course, called the District Officer Course, our officers typically attend formal training courses in negotiating, quality assurance, and contract administration. But we could do a better job of "certifying" our officers to make sure they receive the training and experiences they need to be successful. Several districts, including the Fort Worth Engineer District, are using various certification programs to help focus on developing our officers. This is a work-in-progress that other districts are working on with us to make it even better.

Ideally, the captains that are assigned to an engineer district come to us after completing a company command, but unfortunately that does not always occur. The district and the officer then have to work with the Engineer Branch and the engineer units on post to ensure that our officers are not forgotten and have the opportunity to get in the command queue. In Fort Worth, we generally expect that officers will work for us for two years, and then we try to get them to a unit for command. Because of unit rotations, this is not always possible, but the two-year stint provides a pretty good framework for us to work with. Although it often works best if the officer has already commanded a company, as mentioned previously, an officer with USACE experience is a valuable commodity in any battalion.

An assignment in USACE is a professionally rewarding experience that contributes to the Army, USACE, and the district. You will be a better officer as a result of this tour. The skills you learn and the time you take for professional advancement will ultimately contribute significantly to your development.

Colonel Martin is the 23d commander and district engineer of the United States Army Corps of Engineers, Fort Worth District. He previously commanded the 91st Engineer Battalion, the first Army engineer battalion to field the Bradley fighting vehicle and then fight it at the National Training Center and ultimately in Iraq. He is a graduate of the United States Military Academy, the Engineer Officer Basic Course, the Infantry Officer Advanced Course, Ranger School, and the United States Army War College, and he holds a master's in civil engineering from the University of Illinois.

Endnote

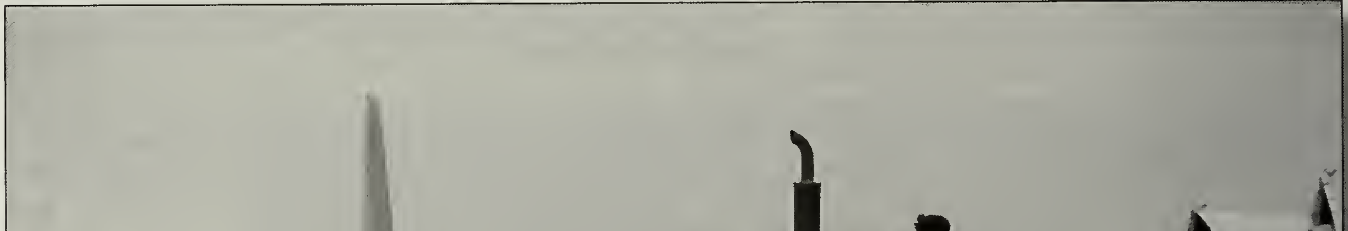
[1] "Who We Are," U. S. Army Corps of Engineers, "The United States Army Corps of Engineers (USACE) is made up of approximately 34,600 civilian and 650 military members." *<http://www.usace.army.mil/who/>* (accessed on 7 April 2008).

The Sun Never Sets on the USAFEG

By Colonel Dwight W. Pearson and Major Curtis L. Decker

For a time it was said that "the sun never sets on the British Empire." We believe that the same could be said of the current reach and effect of the United States Army Facility Engineer Group (USAFEG). Since 11 September 2001, the United States Army Reserve's facility engineer detachments (FEDs) and facility engineer teams (FETs) that belong to the USAFEG have provided extraordinary support to the nation. The USAFEG has deployed 55 FEDs and FETs to such locations as Uzbekistan, Afghanistan, Iraq, Djibouti, Kuwait, Qatar, Bosnia, and Kosovo. During this time, FEDs and FETs have also provided peacetime facility engineering support to locations in Alaska, Hawaii and other Pacific Islands, Germany, and Korea.

The USAFEG is composed of 16 FEDs and 30 FETs distributed across the continental United States and Puerto Rico. A detachment or team is led by an engineer lieutenant colonel and filled with highly skilled engineer officers and senior noncommissioned officers (NCOs). Our officers and NCOs



Road repair at K2 was a top priority in 2002 to improve theater logistics and airbase operations.

hold a large number of professional engineering, construction management, and environmental degrees and nearly one-third are professionally registered. A majority of our personnel work in engineering and construction fields in their civilian jobs. In theaters of operation, USAFEG Soldiers have engaged in projects ranging from helping local nationals rebuild wells to designing and overseeing airfield construction.

The detachments and teams are small, highly autonomous units that work with engineers from sister service units such as the United States Marine Corps, the United States Air Force Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE), and the United States Navy Seabees. They also work with United States Army combat engineers, the United States Army Corps of Engineers (USACE), special operations forces, and local national engineers and contractors.

Army technical engineer teams that can perform in all phases of military operations and contribute to full spectrum operations reside primarily in the Reserve Component. The USAFEG, with previous deployment experience in the Balkans, has been the major contributor of facility engineers during the War on Terrorism. The capabilities of the FEDs and FETs are unique because their personnel possess skills from their civilian experience and deploy as Soldiers when needed.

K2 initially had poor drainage that needed improvement by facility engineers.

According to a former 20th Engineer Brigade commander, the contributions of the FETs to his mission in Iraq in 2004-2005 were essential. He stated that he could not have fought without them. He marveled at the ability of these small teams to have such a great impact on the life support, base operations, command and control, and full spectrum operations of the 8,600 Soldiers under his command. He cited the ability of the teams to leverage USACE and other reachback assets to formulate technical solutions to tactical problems.

One of USAFEG's first deployments after 11 September 2001 was FET 23 to the primitive base camp at Karshi-Khanabad (also known as K2) Airbase in Uzbekistan on 8 December 2001. FET 23 became the Directorate of Public Works in support of Logistics Task Force 507 and the 10th Mountain Division. Team members developed the master plan and managed the base commander's vision for the development and construction of K2 to best support and sustain combat operations in Afghanistan. In addition, FET 23 developed the project design, statement of work, and bid package for all on-base construction in support of the expansion that would be performed by host nation contractor construction and troop labor projects. During FET 23's tour, K2 was transformed from a hastily constructed Harvest Eagle/ Force Provider tent camp, without proper grading and drainage, to a developed camp with metal buildings and proper drainage. The team also increased the throughput into theater by expanding the maximum on-ground capacity for aircraft and improving runway conditions.

FET 16 had a similar impact during War on Terrorism operations while deployed to the Horn of Africa. In October 2002, FET 16 arrived at Camp Lemonier in Djibouti and, in a short period of time, quadrupled the camp's life support capacity, expanded the maximum on-ground capacity for aircraft, and coordinated with USACE to drill water wells. The well-drilling operations were essential to the continued

Well-drilling design and construction is just one of the many services provided by facility engineer detachments and teams.

goodwill of the local populace. Until this time, Camp Lemonier got its fresh water from the local economy, overtaxing the local water supply and threatening to disrupt host nation relations. When their mission was complete in Djibouti, the members of FET 16 departed for an airfield in an undisclosed location, where they planned and executed the hasty construction of a temporary base camp that was essential for close air support and insertion of special operations forces in Iraq.

In Djibouti and other areas of operation, water is a scarce resource. FED Charlie from Tennessee arrived at Tallil Airbase in southern Iraq in April 2003. Using their design and construction management skills, team members devised a plan to reestablish a damaged, nonfunctional irrigation canal to flow from the Euphrates River into a reservoir planned for the airbase. The detachment surveyed the canal and future reservoir site, designed proper slope and drainage, coordinated for multinational troop engineer support, and worked to set up water purification contracts for the reservoir. It was full of usable water by fall 2003.

In the first weeks of the Iraq conflict, FED Bravo from Puerto Rico conducted facility assessments of many Baghdad area power, water, and sewer treatment plants. The detachment also played a key role in establishing Camp Victory near Baghdad International Airport. The grid supplying power to the main palace and to the northern section of Camp Victory was severely damaged. The Puerto Rico detachment conducted utility assessments and determined electric load requirements so that prime power units could establish generator farms and USACE could establish permanent sources of power for this key operating base. The detachment also sent a team to Fallujah and improved conditions for the local populace by working with USACE and contractors to fix power, water, and sewage treatment plants in the area.

While contributions to Operation Iraqi Freedom and Operation Enduring Freedom have been significant, FEDs and FETs have continued to provide other valuable services to the nation. Detachments, teams, and individual Soldiers stand by to provide support and technical expertise in natural disasters such as Hurricane Katrina. They also provide support to major exercises in the continental United States and overseas. In the fall of 2008, a team will deploy to Bulgaria for a 60-day exercise. Also, facility engineer Soldiers are often asked to fill various interesting individual deployments and tours around the world.

The pace of support to the War on Terrorism and other exciting engineering missions continues. Soldiers who have an engineer military occupational specialty, or have relevant civilian engineering or construction management skills, will find that FEDs and FETs offer highly professional, challenging, flexible opportunities with unit locations across the country. For information about joining this dynamic organization, contact the authors.

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Major Decker is the operations officer for the United States Army Facility Engineer Group. He holds a bachelor's in civil engineering from the United States Military Academy at West Point, New York, and a master's in civil engineering from the University of Illinois at Urbana-Champaign. He is a registered professional engineer and a registered structural engineer. His e-mail address is <curtis.decker@us.army.mil>.

SO YOU WANT TO BE A COMPANY COMMANDER?

By Major John N. Carey

> *"Somewhere a True Believer is training to kill you. He is training with minimum food and water, in austere conditions, day and night. The only thing clean on him is his weapon. He doesn't worry about what workout to do–his rucksack weighs what it weighs, and he runs until the enemy stops chasing him. The True Believer doesn't care how hard it is; he knows he either wins or dies. He doesn't go home at 1700—he* ***is*** *home. He knows only The Cause. Now, who wants to quit?"*
>
> *Special Forces Assessment and Selection Course,*
> *Fort Bragg, North Carolina.*

Collected Wisdom

This article provides straightforward, honest advice for future United States Army engineer company commanders. The company commander's battle is personal, intense, and often violent. Whether in garrison or on operations, it is never routine. This document brings together the collective experience of previous company or squadron commanders from the United States Army, United States Marine Corps, Australian Army, and British Army. The contributors have fought in Northern Ireland, Iraq, Bosnia, East Timor, Afghanistan, Solomon Islands, Kosovo, Somalia, Rwanda, and Haiti. They have done the hard yards, made some mistakes, and learned from them. Perhaps their thoughts will be useful as you prepare for command.

You are always the commander. Whether at work, in the field, at home, or on leave, you are always the commander. Everything you do or say (or do not) will be analyzed and discussed by the members of your unit. Lead by example, 24 hours a day, 7 days a week. You must push yourself to be better than everybody else by setting the example in everything from fitness, combatives, and marksmanship, to understanding tactical doctrine and current affairs. When you can, participate with the troops by getting dirty and sweaty. Morale is always high when the Soldiers see the boss out of the tactical operations center (TOC) doing physical training (PT) with the troops or helping out with a work party.

Show the essence of leadership. You provide energy, purpose, direction, motivation, and—most importantly—leadership. Have the confidence to stand alone, the courage to make tough decisions, and the compassion to listen to the needs of others. Take care of your Soldiers and their Families. Train your Soldiers to fight, yet also to do the right thing. Resource your sappers for the task you give them, and do not delude yourself by constantly asking them to "do more with less." Encourage your team to understand their role in the larger plan. Do what you can with what you have, wherever you are. After receiving guidance for a task, do not ask permission—do what needs to be done!

Always be learning for command. You should spend your staff time observing success and failure in commanders. When not in command, make sure you are an instructor so you remain close to the troops. Put away the war novels and read professional books. Read and analyze history to learn how a Soldier thinks and acts, and you will quickly realize that counterinsurgency is not a new training event. You will see how others have achieved success with the barest of resources. You will begin to understand the importance of courage, humility, and fairness.

Learn from your unit's heritage. Keep photos, key documents, and press clippings. Foster links with organizations of retired military engineers. Do not allow yourself to inbreed by studying only Western military history. Read the classics, such as Sun Tzu, Vo Nguyen Giap, Mao Tse-tung, Sayyid Qutb, Carl von Clausewitz, T.E. Lawrence, and Basil Liddell Hart. Also read Lieutenant General Hal Moore, Guy Sajer, Lieutenant Colonel John Nagl, Robert Taber, Jim Collins, and Bruce Gudmundsson. Check out the U.S. Army Chief of Staff's professional reading list at <*http://www.history.army.mil/reference/CSAList/CSAList.htm*>, and read Field Manual (FM) 1.0, *The Army*; FM 1-02, *Operational Terms and Graphics*; FM 3.0, *Operations*; FM 3.24, *Counterinsurgency*; FM 3.34, *Engineer Operations*; and FM 5.0, *Army Planning and Orders Production*.

Talk to everyone you can. Ask your Soldiers about the strengths and weaknesses of the unit. Talk to the executive officer (XO) and first sergeant and get their honest assessments. Talk to the command sergeant major, battalion XO, and operations and training officer, and find out if there are any significant personnel issues or operational tasks coming in the next 90 days. Get a gut feel for how the current commander does business. Understand the deals that have been made, promises issued, contracts negotiated, and missions planned, because you will have to assume ownership of the outcomes. After taking command, never bad-mouth the previous commander. How would your Soldiers know that you will not do the same to them?

Get a real handover from the outgoing commander. As you get ready for the change of command, ask yourself:

- What is the personality of the unit?
- What are its quirks?
- What is the status of discipline, training, morale, and maintenance?

Think smart and not always hard. Aggressiveness and initiative are admirable qualities, but you must also think. Focus on the big picture. Do not get lost in the noise of immediate issues. There may be urgent phone calls and e-mails but spend some time thinking, postulating, and shaping the future of your unit; nobody else will do this if you don't. Develop a command philosophy that lays out your command style, intent, objectives, and priorities. Spend time thinking about this before the change of command ceremony. Recognize that your priorities will change. The baseline must be Soldier first, sapper second, and specialist third. You are there to command, but that also includes leadership and management. Leadership is required in periods of uncertainty, while management looks at the details to ensure efficiency. You cannot focus on just one—you must succeed at all three.

Be honest. When your opinion is sought, be confident, be clear, but above all be honest. Nobody respects a person who offers a view shaped by what he believes is wanted rather than that which he actually believes. Never ask someone to do something you would not do yourself. Do not be afraid to report shortfalls in capability and readiness. Never be afraid to make the hard—but legal—decisions with weak leaders. Do not tolerate bad leaders; bad leaders in peace will be bad leaders on operations. Give unsatisfactory leaders counseling, training, and guidance, but if they do not improve to the standard required, remove them.

Work with the battalion commander. He is not just a provider of tasks but also a valuable source of experience and advice. He will enjoy discussing challenges and issues with you and your team. Keep him informed and demonstrate what you are doing with your

Develop your ability to command in a tactical environment by setting your team up for success.

You provide energy, purpose, direction, motivation, and—most importantly—leadership.

command. Developing a close relationship with the battalion commander and command sergeant major will give you the confidence to approach them on any issue.

Develop an open and honest relationship with your first sergeant. The officers and noncommissioned officers (NCOs) in your unit deserve nothing less. Your unit will fail in its mission unless the commander and the first sergeant speak with the same voice. Whether you visit the troops in the field or conduct PT, your first sergeant must always be with you. Your first sergeant has risen to be the senior Soldier of the company for good reason—he can be trusted. He will think of things you have not. He will not always agree with you, but he will always back you once you've made your decision.

Know your Soldiers and demonstrate genuine concern for them. Ask your Soldiers where they come from, how many kids they have, and what they think of their training. Let Soldiers explain their trade to you so you can represent them better and make more effective decisions on their behalf. The Soldiers will suffer if the boss locks himself away in the TOC. Constant tours and two-way communication with the Soldiers, pats on the back where justified and boots in the backside when required, are mandatory. Get out from behind your desk and establish relationships with your Soldiers, or you will lack awareness of what is really happening in the unit. Never underestimate the importance of simply saying hello. There is nothing more powerful than hearing the boss say, "Hey, you are an outstanding Soldier, and I want to reenlist you in the Army."

Leave the company in better shape than you found it. It is not "your" company—you are just looking after it. Practice mission command both in garrison and on operations. Make sure your subordinates can do the job two levels up. Encourage problem-solving and supervision of tasks at the lowest practical level. Ensure that your first sergeant and senior NCOs stand up and take on big-ticket issues. Give clear commander's intent. Do not get in the habit of giving useless briefings. Properly prepared and issued orders instill discipline and confidence at all levels of command. Subordinates cannot execute mission analysis from a briefing. Give your NCOs the resources, get them to back-brief those orders formally before going on the mission, provide plenty of encouragement, and ensure that they provide a post-brief afterward.

Become a problem solver. The U.S. Army has policies on everything, and they all can be found at Army Knowledge Online. Check current policy first, and be wary of people who insist on relying on memory and are not prepared to quote a reference when asked. They may be hiding ignorance with bluff, or they may have been in the job so long they cannot be bothered to check. Tell your Soldiers early in your tenure how you intend to make decisions:

- Tell me what the problem is.
- Tell me what the policy guidance says.
- Give me options and recommendations.
- I will give you a decision.

You do not need to be an expert at everything since you will be commanding very intelligent and experienced Soldiers, and there is plenty of support available from the chain of command. At the end of the day though, do not be afraid to trust your gut. When you have 70 percent of the facts and time is short, make a decision. Just make sure you know when to stop fighting for something you believe is right. Debate your point of view until a decision is made, and then support the decision wholeheartedly.

Tell others how important engineers are to the fight. We are often very humble about our success. As an engineer commander, you are one of the next leaders of the Regiment. You can play a much larger part in shaping its future direction than you probably realize. Ensure that you get out and sell the engineers and our broad range of capabilities. Educate your supported commanders and your peers. Some of the questions to ask yourself are—

- What do topographic engineers do?
- When was the last time you read FM 3-34, *Engineer Operations*?
- Do you understand the relationship between the breaching organization and breaching fundamentals?
- How are warrant officers integrated into construction effects battalions?
- What do United States Marine Corps, Navy Seabee, and Air Force engineers bring to the fight?
- What engineer capabilities do the Aussies, Brits, and Canadians have that I might use in-theater?

Know all the capabilities of military engineers and their effects across the full spectrum of operations.

Talk the talk and walk the walk. Work hard to develop relationships with your supported commanders. Aim to make yourself an integral part of their team. Educate them by giving them briefs that explain your role and capabilities, if necessary. When you walk into any TOC, you should know just as much about combined arms operations and warfighting philosophy as any infantry or armor officer at your level. Do you understand the maneuverist approach, targeting, effects-based operations, and the intelligence cycle? As either a staff officer or commander, always be thinking about how to promote engineers. Do small things well. Ask of any project how can it be done better. Strive for self-improvement through constant self-evaluation—of both your unit and yourself as an engineer officer.

Communications are the key. With so much done by computers, e-mails, Blackberrys, conferences, and committees, make sure you get around to your team, listen, and then talk to them. Determine who will tell you the truth about the company and form good relationships with them. Talk to the chaplain, medical officer, supply staff, and unit mechanics. Walking around with a cup of coffee is a great approach. Face-to-face contact is best, followed by radio or telephone, and finally by written communication. You can always tell by the look in someone's eye or the tone of someone's voice if the person got your message. Ask yourself which form of communication you would prefer with your boss while in the fight—an impersonal e-mail or a calm face and reassuring voice.

Maintain a healthy ego but keep it in check. Your company might be the best in the battalion, but there is no need to rub it in the faces of the other company commanders. Be passionate but humble. You are part of a team, and you need to look after and assist each other. In all forms of communication, use "we" more than "me, myself, and I," unless you are expressing your intent or taking responsibility. When talking to other Soldiers, spouses, partners, or anyone else, it is more respectful to use the phrase, "I work with Private X," rather than, "Private X works for me." Respect is a two-way street.

Work to maintain readiness. Do not underestimate how much work is involved in that task; understand Army systems, check, then keep rechecking. Constantly prepare your personnel for operations, establish readiness procedures, and practice call-outs. Train as you fight, and fight as you train. Whether you are fighting in Belfast, Dili, or Baghdad, or just "shooting the breeze" in the United States, you are always training your Soldiers. Engineers must maintain both technical engineer and military skills. If you neglect either of these, you will be irrelevant to the fight. A tool some commanders use is to color-code the training program; green for engineer skills training, red for military skills. You will quickly see how the balance looks and where your gaps exist. Remember, military engineers are thinking Soldiers and thinking Soldiers need rest. Attempt to achieve the required task to operational standards at the least cost to your men. After 15 months in Mosul or Darfur, you will value the personal reserves this will create.

Care for your unit's personnel and equipment. Good units do routine things routinely—find a way to make maintenance and supply a part of your weekly battle cycle and protect their importance. Equipment care is vital because it underpins operational success. As a commander, you will be unable to get involved in the plethora of detail on equipment care, but your subordinates must understand its importance and that you take it seriously. Early in your tenure, seek out key people in the battalion who can assist you. Act quickly to resolve the issues that affect your people, especially areas of pay, housing, and medical care. Learn about the capabilities of the information systems in your unit. Before you get frustrated with your subordinates, understand what they are dealing with. Assist them by telling the chain of command what the problems are and look for ways to fix them.

Be brilliant at the basics. Always maintain an operational focus. With 2,000 years of example behind us, we have no excuse for not understanding how to fight the "Three-Block War." Develop your ability to command in a tactical environment by setting your team up for success. At the company level, practice the military decision-making process. Ensure that your platoon leaders use troop-leading procedures (TLP). Write operations orders both in garrison and on operations. Get out with your lieutenants and NCOs; go on terrain walks; conduct tactical exercises without troops (TEWTs); read and discuss controversial articles; discuss current affairs, technical procedures, doctrine, and the military art. When visiting Soldiers in the field, help them focus on the way they communicate; for instance, sappers do not "blow stuff up," they attack targets. Know your weapons and communications systems and how to employ them to best effect. Marksmanship, PT, first aid, communications, navigation, and battle drills are essential for survival. Do you and your Soldiers know how to operate every weapon in the company? Does your company execute full spectrum PT—aerobic, anaerobic, battle, confidence, obstacles, ropes, rifle, games, competitions, and team sports? Do your Soldiers know how to navigate using both a compass and a global positioning system? Do your Soldiers know how to organize a casualty evacuation?

Never underestimate the need for technical control. An engineer mission will fail if it is not technically correct. Signs of a possible decline in engineer technical competence include—

- The United States Army Corps of Engineers (USACE) response in the aftermath of Hurricane Katrina.
- Comments from senior military engineer leaders regarding engineer support to the War on Terrorism.
- Increased emphasis from senior leaders on construction engineering tasks because of stability operations and lack of technical competence within USACE.
- The failure of the current engineer force structure to facilitate senior engineer mentoring of junior engineer officers.
- Known decreases in military engineering developmental assignments.
- A shift toward a mobility and countermobility mentality in the Engineer Regiment.

The Chief of Engineers has asked the commandant of the United States Army Engineer School to lead further investigation and resolution of the decline, and company commanders can help. Technical control can cross boundaries if you plan and specify it in orders—be smart and use the network and people available. If you are a civil engineer, get your professional engineering license.

Ensure that your Soldiers complete technical courses at the USACE Learning Center at Huntsville, Alabama; USACE Protective Design Center at Omaha, Nebraska; and the United States Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio. Ensure that our technical skill base is being preserved and not degraded by workloads that are repetitive in a narrow skills band or are non-engineer tasks. Write about your experiences in professional publications. Examine how your allies support general engineering. Seek reachback solutions from industry and the Corps. Get involved in the Society of American Military Engineers, industry, and other relevant professional associations. Use civil detachments and two-way exchanges, which are normally cheap and effective training. Ensure that these organizations understand you and your role. Prepare a simple memorandum of understanding to cover both the Army and the organization.

Look after Families. We cannot do without the support of our Families. Soldiers cannot keep their minds on the job and be effective if there are problems at home. Keep Families informed, and know how the Family Readiness Group works. Make sure you program stand-downs to coincide with school vacation to give partners a break from looking after the kids on their own. Socialize and get to know the Families and friends of the company. Write letters to parents telling them how well their son or daughter is doing in the unit. Conduct briefings and open days for Families. Do everything you can to support Families, but develop a thick skin too. Nothing will ever be enough for some, and you can never please everyone, particularly the vocal minority. Do not let this get you down or deter you from doing your best for all Families.

Conclusion

You have been deployed to Iraq and/or Afghanistan not just twice but three times. You have been a platoon leader in combat and have spent some time as a fighting XO. You have seen company commanders come and go. Some were studs and others were not so good. You have read The Challenge of Command *by Roger H. Nye,* Small Unit Leadership *by Dandridge M. Malone, and* Company Commander *by Charles Brown MacDonald. You have completed the Engineer Captains Career Course and the Sapper Leader Course. You are studying Arabic, Farsi, or Pashto because you know that you are engaged in a "Long War." You've spent the last few years building the skills, experience, and judgment that you believe are critical for successful company command. Are you ready to take up the guidon?*

Acknowledgements

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Reorganizing the DPW in Iraq

By Lieutenant Colonel Gregory B. Kniesler

It was anticipated in 2005 that if U.S. forces remained in Iraq, they would occupy four large contingency operations bases (COBs). This assumption lead to the sourcing of four facility engineer teams (FETs) to supplement the anticipated Directorate of Public Works (DPW) cells of mayor's sections created from the respective area support groups. By late 2007, U.S. forces had more than 50 bases throughout Iraq, some of them exceeding the concept of a COB, and all requiring more facilities engineering expertise than was available.

DPW Challenges

While each base is slightly different, Logistical Support Area (LSA) Anaconda will serve as an example. The mayor's section—an ad hoc unit responsible for the administration of the base—has a DPW cell consisting of three officers, supported by a FET, which is responsible for the management of a COB with the population of a small city. The challenges facing this team are—

- Delivery of utilities.
- Planning for the growth of new programs.
- Competing interests for real estate.
- Improvements to quality of life.
- Quality of contract construction.

Working closely with this team are—

- KBR, the Logistics Civil Augmentation Program (LOGCAP) operations and maintenance contractor.
- The Gulf Region Division office of the United States Army Corps of Engineers (USACE).
- Local contractors.

Even with these enablers, the staff is challenged by the requirements of running the facility.

The FET has been assigned to provide master planning support and develop and execute construction projects for the COB tenant units and organizations. The FET has some design capability and provides expertise in facilities engineering and construction management. However, there are many more locations in-country that need FET assistance with everything from drainage issues to building design such as ammunition holding and transfer point placement and construction.

The LOGCAP contract provides the basis for obtaining critical logistic and life sustainment services in the operational environment. This is a proven concept and has reduced the number of Soldiers providing logistics, enabling the Army to use its personnel for combat power and direct combat support roles. It should be remembered, however, that this effort is a contract and the purpose of any business bidding on work is to make a profit. KBR provides its services for a fee. The government's representative, whether military or civilian, should know the facilities operations and management business just as well as the contractor to ensure the implementation of the most efficient solution that meets

A Soldier modifies a manhole to add to an existing drainage system to accommodate the COB's expanding needs.

mission requirements. Independent government estimates and engineering designs should be developed by experienced engineers who know the facilities business. Contract oversight is still required by the customer to ensure that services are delivered.

Unmarked buried utilities create a challenge for trenching operations during base improvements.

Long-Term Solutions Required

Since U.S. forces were working in a tactical environment, originally it was believed that long-term solutions were not required. The relatively short deployment cycles of Army and Air Force DPW units helped perpetuate that outlook. Those cycles focused on providing immediate needs and responding to the tactical fight, rather than planning for future requirements. The long-term focus has been provided by the Multinational Corps–Iraq (MNC-I) engineer staff (C7) in the development of some military construction (MILCON) projects such as power plants and incinerators. The result of this is a lack of focus on some installation-level infrastructure concerns such as water distribution, storm water management, and other issues that require a longer-term approach to design and construction.

I believe that the cause of these problems is the lack of a professional DPW staff that is sized appropriately for the COB population. The Army should provide a phased approach to a civilian DPW with a military director. This approach would be no different from the evolution of support in Bosnia or for the bases in Kuwait. Early in the Iraq War, FETs were deployed to Kuwait as the DPW cell for bases there, and that support was phased out by Army Central Command as those bases evolved. The target for implementation of the phased plan in Iraq should be fiscal year 2009, which would correspond to the current FET deployments. This DPW organization could work for either the theater engineer or the corps support command.

The initial step is for the FET and mayor's section to hire civilian engineers (either vetted local nationals or expatriates) to augment the DPW workforce. The hiring of local nationals could provide a secure environment for professionals to return to Iraq with opportunities for long-term employment. Positions required would include construction management professionals and design engineers of all disciplines. This would facilitate improvement of services on those COBs that have FETs, allowing for a complete implementation of the current plan to have the FETs provide services in general support to the support command and multinational divisions. By thickening the engineer force with additional workers, Army and Air Force engineers could leave the COB work to a civilian workforce and focus their own efforts on the more remote forward operating bases (FOBs) and combat outposts that need engineering assistance.

The follow-on organization should be developed by the theater engineer and Army Central Command to manage this high-cost area of infrastructure support. A Directorate of Facilities Engineering-Iraq, headed by a colonel and charged with management of the COBs in Iraq, should be established. Initially, this could be an expanded engineering and reconstruction (G7) section of the corps support command, providing logistics support to the major COBs. This management task should include authority for the operations and maintenance budget, which would provide central management, command emphasis, and visibility of the costs associated with the COBs. In addition, this new directorate should be the conduit of good ideas from one COB to another and the repository of successful statements of work for service contracts. The force structure would include officers who would report to the directorate but work for each COB. These officers would manage a civilian DPW organization consisting of Department of the Army civilians and contractors (or local national workers, as appropriate).

> ***"The LOGCAP contract provides the basis for obtaining critical logistic and life sustainment services in the operational environment."***

(continued on page 76)

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	10 Mar 03	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Revision Highlights**: Modular engineer force (MEF), warfighting functions, explosive ordnance clearance agent (EOCA), and the maneuver enhancement brigade (MEB). **Status**: Under revision in FY 08.
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations – Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Revision highlights**: MEF and warfighting functions. **Status**: Preparing the approved final draft for staffing.
FM 3-34.23 (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations – Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and echelons above corps). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15, and FM 5-116. **Revision Highlights:** MEF, warfighting functions, and MEB considerations. **Status**: Preparing the initial draft for staffing.
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. **Revision Highlights**: MEF, five areas of mobility (breaching, clearing, gap crossing, combat roads and trails, forward aviation combat engineering [FACE]), improvised explosive devices (IEDs), urban breaching, and warfighting functions. **Status:** In final draft
FM 3-90.12 (FM 90-13)	*Combined Arms Gap Crossing Operations*	Jan 98	This is a full revision, to include renaming and renumbering of FM 90-13/ MCRP 3-17.1, *River Crossing Operations*. This manual is and will continue to be a dual-designated manual with the Marine Corps. Changes in the force structure have required that the TTP associated with river crossing be adjusted. The revised manual incorporates considerations for all gap crossing operations, not just river crossings.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
			Combat Engineering (continued)
FM 3-90.12 (FM 90-13)	*Combined Arms Gap Crossing Operations (continued)*	Jan 98	**Revision Highlights***:* MEF, engineer reconnaissance, gap crossing definitions, and warfighting functions. **Status***:* The estimated posting to Army Knowledge Online (AKO) is Summer 2008.
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sep 94; Mar 85	This revised manual will contain the fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE). **Revision Highlights:** MEF, warfighting functions, and intelligent munitions. **Status:** Preparing program directive and initial draft.
FM 3-34.170 (FM 5-170)	*Engineer Reconnaissance*	May 98	This manual provides doctrinal guidance for engineer reconnaissance across the full spectrum of operations. It encompasses engineer reconnaissance in support of tactical operations, as well as engineer technical reconnaissance support, and introduces infrastructure reconnaissance **Revision Highlights**: Introduces infrastructure reconnaissance (assessment and survey), environmental reconnaissance (assessment and survey), engineer reconnaissance teams, field force engineering (FFE), and other reachback mechanisms. **Status**: Recently published on AKO.
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This manual provides survivability information needed by commanders and staff at the tactical level. It includes guidance on integrating survivability into planning and order production and creation of the engineer running estimate. It provides examples of a survivability capabilities card, matrix, and timeline to assist with the planning, revision, and conduct of specific survivability tasks. **Revision Highlights:** Protection, hardening, antiterrorism considerations, and warfighting functions. **Status:** On hold for release of FM 3-10**.**
FM 3-34.281 (FM 20-11)	*Military Diving*	Jan 99	This manual, formerly an adaptation of the Navy diving manual, will support one of the modular units of the MEF. Within the Army, it is used by special operations forces, as well as engineer divers. **Revision Highlights:** The entire Navy diving manual will not be adopted; instead, the targeted sections applying to Army diving use will be adopted with other Army-specific considerations being added. **Status:** Developing the program directive.
			General Engineering
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This manual describes the operational environment (OE) and how to apply and integrate general engineering principals in support of full spectrum operations. It focuses on the establishment and maintenance of lines of communications and engineer support to sustainment operations throughout the area of operation. Although not designated as a multi-Service publication, it is intended to inform all Service components of the types of general engineering tasks, planning considerations, the variety of units available to perform them, and the capabilities of Army engineers to accomplish them.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.400 (FM 5-104)	*General Engineering (continued)*	Nov 86	**Revision Highlights:** Infrastructure reconnaissance, FFE (reachback), homeland support, MEF, and warfighting functions. **Status:** Estimated posting to AKO is Summer 2008.
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Navy plans to adopt it as well. **Revision Highlights:** This is a collaborative effort with the Engineer Research and Development Center (ERDC) and the U.S. Army Corps of Engineers (USACE) Transportation Center of Excellence (Omaha), Air Force, Air Force Civil Engineering Support Agency (AFCESA), and the Navy. It includes the newest technologies, current practices, and revision of formulas. **Status:** Staffing the program directive and developing the initial draft.
FM 3-34.428 (FM 5-424)	*Theater of Operations Electrical Systems*	Jun 97	This manual is a reference and training guide for engineer personnel responsible for planning and executing theater of operations (TO) construction. It provides practical information for military personnel in the design, layout, installation, and maintenance of exterior and interior electrical wiring, and power-generation and distribution systems. **Revision Highlights**: This manual needs to be revised to make it more comprehensive and includes more details on tactical power generation below prime power, power distribution, the newest technologies, and current practices in the deployed environments. **Status**: Developing the program directive.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. **Revision highlights:** It is a collaborative effort with ERDC and USACE Transportation Center of Excellence (Omaha), the Air Force, AFCESA, and the Navy. Newest technologies, current practices, and revision of formulas. **Status**: Staffing the program directive and developing the initial draft.
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. **Revision Highlights:** This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. **Status:** Staffing the program directive and initiating development of the initial draft.

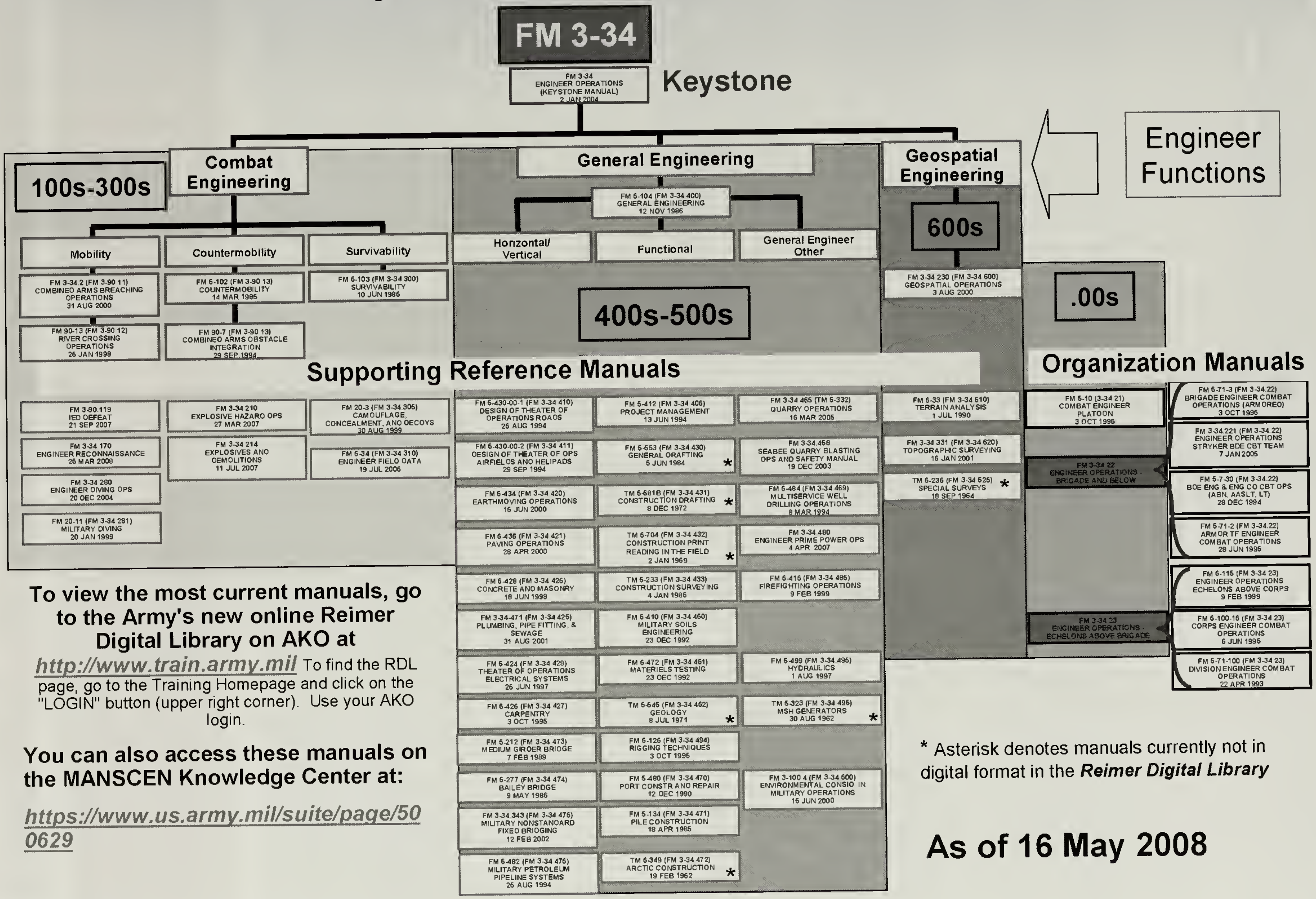
ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. **Revision Highlights:** This collaborative effort with the Navy, and possible Air Force participation, includes the newest technologies, current practices, and revised formulas. **Status:** Staffing the program directive and developing initial draft.
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	This manual gives directions on deploying and using engineer firefighting teams. These teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a TO. **Revision Highlights**: This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status**: Initiating the program directive and developing the initial draft.
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Revision Highlights**: The revision will contain information and lessons learned from current operations. It will continue to be a dual-designated manual with Marine Corps involvement. **Status:** Editing the final electronic file, then perform quality control; forward to Combined Arms Doctrine Directorate (CADD), with an estimated posting to AKO as Fall 2008.
Geospatial Engineering			
FM 3-34.600 (FM 3-34-230)	*Geospatial Operations*	3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0 *Operations*. Geospatial engineering consists of those engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Revision Highlights:** Terrain analysis; terrain geospatial data management; baseline survey data; identification of significant cultural sites and natural resources and force bed-down analysis. **Status:** Doctrine development contract awarded; initiating program directive.

NOTE: All current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil/*>or the Engineer Doctrine MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at <*jeffery.beacham@us.army.mil*>. The development status of these manuals was current as of 28 May 2008.

Army Engineer Publications Hierarchy



FM 3-34

FM 3-34
ENGINEER OPERATIONS
(KEYSTONE MANUAL)
2 JAN 2004

Keystone

Engineer Functions

Combat Engineering

100s-300s

Mobility

FM 3-34.2 (FM 3-90 11)
COMBINED ARMS BREACHING OPERATIONS
31 AUG 2000

FM 90-13 (FM 3-90 12)
RIVER CROSSING OPERATIONS
26 JAN 1998

Countermobility

FM 6-102 (FM 3-90 13)
COUNTERMOBILITY
14 MAR 1985

FM 90-7 (FM 3-90 13)
COMBINED ARMS OBSTACLE INTEGRATION
29 SEP 1994

Survivability

FM 6-103 (FM 3-34 300)
SURVIVABILITY
10 JUN 1986

General Engineering

400s-500s

FM 6-104 (FM 3-34 400)
GENERAL ENGINEERING
12 NOV 1986

Horizontal/ Vertical

Functional

General Engineer Other

Geospatial Engineering

600s

FM 3-34 230 (FM 3-34 600)
GEOSPATIAL OPERATIONS
3 AUG 2000

.00s

Supporting Reference Manuals

FM 3-90.119
IED DEFEAT
21 SEP 2007

FM 3-34 170
ENGINEER RECONNAISSANCE
25 MAR 2008

FM 3-34 280
ENGINEER DIVING OPS
20 DEC 2004

FM 20-11 (FM 3-34 281)
MILITARY DIVING
20 JAN 1999

FM 3-34 210
EXPLOSIVE HAZARD OPS
27 MAR 2007

FM 3-34 214
EXPLOSIVES AND DEMOLITIONS
11 JUL 2007

FM 20-3 (FM 3-34 306)
CAMOUFLAGE, CONCEALMENT, AND DECOYS
30 AUG 1999

FM 6-34 (FM 3-34 310)
ENGINEER FIELD DATA
19 JUL 2006

FM 5-430-00-1 (FM 3-34 410)
DESIGN OF THEATER OF OPERATIONS ROADS
26 AUG 1994

FM 5-430-00-2 (FM 3-34 411)
DESIGN OF THEATER OF OPS AIRFIELDS AND HELIPADS
29 SEP 1994

FM 6-434 (FM 3-34 420)
EARTHMOVING OPERATIONS
16 JUN 2000

FM 6-436 (FM 3-34 421)
PAVING OPERATIONS
28 APR 2000

FM 6-428 (FM 3-34 426)
CONCRETE AND MASONRY
18 JUN 1998

FM 3-34-471 (FM 3-34 425)
PLUMBING, PIPE FITTING, & SEWAGE
31 AUG 2001

FM 5-424 (FM 3-34 428)
THEATER OF OPERATIONS ELECTRICAL SYSTEMS
26 JUN 1997

FM 5-426 (FM 3-34 427)
CARPENTRY
3 OCT 1995

FM 5-212 (FM 3-34 473)
MEDIUM GIRDER BRIDGE
7 FEB 1989

FM 6-277 (FM 3-34 474)
BAILEY BRIDGE
9 MAY 1986

FM 3-34 343 (FM 3-34 476)
MILITARY NONSTANDARD FIXED BRIDGING
12 FEB 2002

FM 5-482 (FM 3-34 476)
MILITARY PETROLEUM PIPELINE SYSTEMS
26 AUG 1994

FM 6-412 (FM 3-34 406)
PROJECT MANAGEMENT
13 JUN 1994

FM 5-553 (FM 3-34 430)
GENERAL DRAFTING
5 JUN 1984 *

TM 5-681B (FM 3-34 431)
CONSTRUCTION DRAFTING
8 DEC 1972 *

TM 6-704 (FM 3-34 432)
CONSTRUCTION PRINT READING IN THE FIELD
2 JAN 1969 *

TM 5-233 (FM 3-34 433)
CONSTRUCTION SURVEYING
4 JAN 1986

FM 6-410 (FM 3-34 450)
MILITARY SOILS ENGINEERING
23 DEC 1992

FM 6-472 (FM 3-34 461)
MATERIELS TESTING
23 DEC 1992

TM 5-545 (FM 3-34 462)
GEOLOGY
8 JUL 1971 *

FM 6-126 (FM 3-34 494)
RIGGING TECHNIQUES
3 OCT 1995

FM 5-480 (FM 3-34 470)
PORT CONSTR AND REPAIR
12 DEC 1990

FM 5-134 (FM 3-34 471)
PILE CONSTRUCTION
18 APR 1985

TM 6-349 (FM 3-34 472)
ARCTIC CONSTRUCTION
19 FEB 1962 *

FM 3-34 465 (TM 5-332)
QUARRY OPERATIONS
16 MAR 2005

FM 3-34.468
SEABEE QUARRY BLASTING OPS AND SAFETY MANUAL
19 DEC 2003

FM 6-484 (FM 3-34 469)
MULTISERVICE WELL DRILLING OPERATIONS
8 MAR 1994

FM 3-34 480
ENGINEER PRIME POWER OPS
4 APR 2007

FM 6-416 (FM 3-34 485)
FIREFIGHTING OPERATIONS
9 FEB 1999

FM 5-499 (FM 3-34 495)
HYDRAULICS
1 AUG 1997

TM 5-323 (FM 3-34 495)
MSH GENERATORS
30 AUG 1962 *

FM 3-100 4 (FM 3-34 600)
ENVIRONMENTAL CONSID IN MILITARY OPERATIONS
15 JUN 2000

FM 6-33 (FM 3-34 610)
TERRAIN ANALYSIS
1 JUL 1990

FM 3-34 331 (FM 3-34 620)
TOPOGRAPHIC SURVEYING
16 JAN 2001

TM 6-236 (FM 3-34 526)
SPECIAL SURVEYS
18 SEP 1964 *

Organization Manuals

FM 5-10 (3-34 21)
COMBAT ENGINEER PLATOON
3 OCT 1995

FM 3-34 22
ENGINEER OPERATIONS - BRIGADE AND BELOW

FM 5-71-3 (FM 3-34.22)
BRIGADE ENGINEER COMBAT OPERATIONS (ARMORED)
3 OCT 1995

FM 3-34.221 (FM 3-34.22)
ENGINEER OPERATIONS STRYKER BDE CBT TEAM
7 JAN 2005

FM 5-7-30 (FM 3-34.22)
BDE ENG & ENG CO CBT OPS (ABN, AASLT, LT)
28 DEC 1994

FM 5-71-2 (FM 3-34.22)
ARMOR TF ENGINEER COMBAT OPERATIONS
28 JUN 1996

FM 3-34 23
ENGINEER OPERATIONS - ECHELONS ABOVE BRIGADE

FM 6-115 (FM 3-34 23)
ENGINEER OPERATIONS ECHELONS ABOVE CORPS
9 FEB 1999

FM 6-100-16 (FM 3-34 23)
CORPS ENGINEER COMBAT OPERATIONS
6 JUN 1995

FM 6-71-100 (FM 3-34 23)
DIVISION ENGINEER COMBAT OPERATIONS
22 APR 1993

To view the most current manuals, go to the Army's new online Reimer Digital Library on AKO at http://www.train.army.mil To find the RDL page, go to the Training Homepage and click on the "LOGIN" button (upper right corner). Use your AKO login.

You can also access these manuals on the MANSCEN Knowledge Center at:

https://www.us.army.mil/suite/page/500629

* Asterisk denotes manuals currently not in digital format in the ***Reimer Digital Library***

As of 16 May 2008

OPERATION MARKET GARDEN

THE BATTLE FOR ARNHEM

By Captain Brodie K. Hoyer

Each session of the Engineer Captain's Career Course (ECCC) is required to write an article analyzing a historical battle, and the best overall professional article receives the Thomas Jefferson Writing Excellence Award. This article was judged the best article of ECCC 4-07.

For the paratroopers of Lieutenant Colonel (LTC) John Frost's 2d Parachute Battalion, success in Operation Market Garden must have seemed almost inevitable. After an unopposed daylight jump, they were greeted in the Dutch village of Heavedorp—not by German opposition but by throngs of civilians who paraded them through the streets as liberators. Despite this auspicious beginning, LTC Frost and his entire battalion would be lost within three days and the remainder of the British 1st Airborne Division would be forced into a desperate retreat back across the Rhine River.

Operation Market Garden was a World War II attempt by Allied airborne and ground troops to capture a series of bridges over Dutch waterways in order to open a way across the Rhine River into the Ruhr Valley, Germany's industrial heartland. It was the largest airborne operation of the war and the costliest. The British assault on the Dutch town of Arnhem was the biggest failure of the operation because the British landed too far from their targets and German defenses were much stronger than expected. Of the 10,000 British airborne troops who landed around Arnhem, 1,130 were killed and 6,450 were captured.[1]

Battle for Arnhem

The battle for Arnhem (17-26 September 1944) was fought between the 1st Airborne Division under the command of Major General (MG) R.E. Urquhart and hastily formed elements of the German *Kampfgruppe* (KG) (or Task Force) *Hohenstauffen*, commanded by LTC Walther Harzer. The outcome of the battle was unexpected, primarily because of the original comparison of forces. The 1st Airborne Division was a fully manned division, comprising three British airborne brigades, an airlanding brigade, and a Polish parachute brigade in reserve. KG *Hohenstauffen* was a division on paper only, with a true strength of little over 3,500 men.[2] In reality, it was the battle-worn remnants of the 9th Schutzstaffel (SS) Panzer Division *Hohenstauffen*.

There were several reasons for the stunning defeat.

- The British forces were unable to achieve surprise and concentration early in the battle, allowing the German defenders to set the tempo of the battle.
- MG Urquhart, commander of the British division, lost command and control of the battle at a very crucial point.

- The Germans, because of the experience of their commander, were able to correctly identify and attack the airborne force's center of gravity.

First Key Event

The first key event in this battle—the fact that the British first wave consisted of only half of the 1st Airborne Division and was forced to land 7 to 9 kilometers from Arnhem—emphasizes the importance of concentration and surprise to an offensive. Field Manual (FM) 3-0, *Operations*, defines four characteristics of offensive operations:[3]

- Surprise
- Concentration
- Tempo
- Audacity

It states that *surprise* is achieved by attacking at a time or place or in a manner for which the enemy is unprepared and cautions that tactical surprise is fleeting and must be exploited before the enemy can react.[4] *Concentration* is "the massing of overwhelming effects of combat power to achieve a single purpose."[5] In addressing *tempo*, the FM states that "a faster tempo allows attackers to disrupt enemy defenses quicker than the enemy can respond."[6] *Audacity* "is a simple plan of action, boldly executed."[7]

Causes. The causes of this first key event lie primarily in the planning of the operation. From the outset, Allied air forces did not have sufficient gliders and transport aircraft to move the entire division in one lift. This deficiency was compounded by the fact that the division was forced to give up a battalion's worth of lift assets in order to tow elements of the corps headquarters, a force whose presence at the front was largely unnecessary.[8] In an effort to allay the shortage of aircraft, commanders from all the divisions involved suggested that two troop lifts be performed on the first day, thus doubling the initial troop strengths. However, the Allied air transport commander, United States Army Air Force (USAAF) MG Paul Williams, refused, claiming that his air crews would be exhausted and that his ground crews would need time to repair the damage he expected the aircraft to suffer during the first landings.[9] USAAF concerns also forced the landings to more distant drop zones (DZs) and landing zones (LZs) since it was feared that zones nearer to Arnhem would expose the transports to German antiaircraft (AA) fire.[10]

The multilift concept of Operation Market Garden did not simply mean that MG Urquhart had fewer forces on the ground. Because the lifts would be accomplished over several days, it was necessary for the 1st Airlanding Brigade under BG Philip Hicks to secure the DZs/LZs in the interim to prevent German counterattacks against vulnerable landing forces.[11] Thus, of four brigades under his command, MG Urquhart's initial attacking force consisted of only the 1st Parachute Brigade under BG Gerald Lathbury.[12] By dividing an already diminished force, MG Urquhart had effectively sacrificed his ability to concentrate forces toward the attack into Arnhem. This would prove especially detrimental since poor weather at the departure airfields would delay the landing of the British second wave by almost nine hours,[13] and would ground MG Stanislaw Sosabowski's Polish Parachute Brigade for two days.[14]

Had it not been for the great distances between the DZs/LZs and Arnhem, it might have been possible for MG Urquhart to overcome his initial lack of forces by moving swiftly into the city and securing defensive positions around the bridge. By all accounts, the German defenders were not expecting an airborne operation at Arnhem. As the first wave landed, LTC Harzer was

Photo courtesy of the Imperial War Museum, London No. BU 001144

Soldiers of the 1st Airlanding Brigade take up positions on the outskirts of Arnhem on 18 September 1944. The Soldier on the left is manning a British antitank weapon, a Projector, Infantry, Antitank (PIAT).

attending a military parade,[15] while Captain (CPT) Sepp Krafft and his SS training battalion—which would quickly become the cornerstone of the German defense—were merely conducting training exercises west of Arnhem.[16]

Unfortunately, the distance between the DZs/LZs and Arnhem, combined with the fact that most of his forces were dismounted, prevented MG Urquhart from properly exploiting the initial surprise of the attack. By the time the battalions of 1st Parachute Brigade were formed and ready to move, CPT Krafft had already placed two of his companies into hasty defensive positions and called up his third company as a reserve.[17] This would prove crucial since his blocking position would blunt the advance of both 1st and 3d Parachute Battalions, giving the Germans time to reinforce Arnhem and control the tempo of the battle to their advantage.

Photo courtesy of the Imperial War Museum, London No. BU 001091

British Soldiers march with their vehicles and equipment along a road toward Arnhem.

Lesson Learned. The lesson to be drawn from this event is that the attacking force must immediately seize the initiative, set a faster tempo in the battle, and keep the defender off guard for an offensive operation to be successful. Failure to do so will give the defender an opportunity to slow the tempo, improve their defenses, and redistribute combat power to the points of attack. Attacking forces can gain the initiative by achieving surprise and massing combat power quickly against key defensive points.

Second Key Event

The 1st Airborne Division's inability to attain surprise was further hampered by a second key event: documents detailing the 101st Airborne Division's orders for Operation Market (the airborne portion of Operation Market Garden) were recovered by the Germans and delivered to General (GEN) Kurt Student's headquarters.[18] Beyond the obvious operations security (OPSEC) implications, this event and GEN Student's swift reaction emphasized the importance of identifying and attacking an enemy's center of gravity to achieve victory. FM 3-0, in discussing operational design, defines a center of gravity as "those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight."[19] Moreover, it states that identifying and neutralizing an enemy's center of gravity is the "most direct path to victory."[20]

Cause. The cause of this event was simply a blatant OPSEC violation. The documents were discovered on the body of an American officer whose glider had been shot down near GEN Student's headquarters in Vught.[21] Although the documents did not include any information on the 1st Airborne Division's mission, GEN Student was able to combine the information from them with the reports he had received on the landings to determine that the bridges were the Allied objectives. The capture of this information would prove especially catastrophic for the Allies because of GEN Student's experience in leading German airborne operations in Italy and Holland.[22] He knew that an airborne force's center of gravity lay in its ability to strike quickly and exploit the element of surprise to secure objectives. He also understood that airborne forces had two inherent vulnerabilities: They would be comparatively lightly equipped and would have no established lines of communication, relying instead on aerial resupply and reinforcement. His defensive plan was thus based on two objectives: slow the British forces until KG *Hohenstauffen* could be reinforced with more men and heavier armaments, and seize the British DZs/LZs to interdict aerial resupply and reinforcement.

In order to wage an effective defense, it was first necessary for the Germans to organize several disparate company-size

Photo courtesy of the Imperial War Museum, London No. HU 002129

British prisoners march away under guard of their German captors. Some 6,450 of the 10,000 British paratroopers who landed at Arnhem were taken prisoner. (German photograph)

elements operating in the Arnhem area into KGs. Within hours of the landing, two such task forces had already begun to form. KG *Spindler*, initially comprising CPT Krafft's training battalion, an engineer company, and an artillery battery, was tasked with establishing a defensive line west of Arnhem.[23] Similarly, KG *von Tettau*—formed from such varied units as a battalion of Dutch SS troops, an artillery unit with no guns, and students of an SS noncommissioned officers academy at Arnhem—was tasked with seizing the British DZs/LZs.[24] Although both KGs were skeletal at first, GEN Student pushed for and received reinforcements over the course of the next five days, again capitalizing on his ability to slow the tempo of the battle.

Although the Germans assumed a great deal of tactical risk in incorporating these loosely organized units into their defensive plan, it proved worthwhile. KG *Spindler*, with CPT Krafft's battalion, halted the advance of 1st and 3d Parachute Battalions, effectively isolating LTC Frost's 2d Parachute Battalion from immediate resupply or reinforcement.[25] The efforts of KG *von Tettau* to isolate the British 1st Airborne Division as a whole proved equally effective. Over the course of the battle, it is estimated that only 7.4 percent of Allied resupply drops were successful.[26] The remainder dropped onto DZs/LZs that had been recaptured by the Germans or fell victim to German AA fires, which were steadily reinforced throughout the fighting. Allied reinforcements fared no better. On 19 September, a portion of MG Sosabowski's Polish Parachute Brigade, traveling in 35 gliders, touched down in an LZ still under German control. Only two antiaircraft guns and a small contingent of men survived the landing.[27] Although the remainder of MG Sosabowski's brigade eventually landed south of the Rhine, it would be another four days before it could cross the river and reinforce the British forces, as all crossing assets were located with the Allied ground forces in Nijmegen.[28]

Lessons Learned. The most obvious lesson from this event is the need to maintain OPSEC at all times. Especially in today's contemporary environment—where volumes of data on operations, units, and Soldiers can be stored in a single memory stick—constant vigilance is required on the part of every leader to ensure that information is properly safeguarded. A second and equally important lesson is the value of correctly identifying and neutralizing the enemy's center of gravity while protecting one's own. As with the Germans at Arnhem, doing so can overcome disadvantages in technology, manpower, or firepower that would otherwise prove overwhelming.

Third Key Event

In addition to isolating LTC Frost's 2d Parachute Battalion, KG *Spindler's* defense against 1st and 3d Parachute Battalions inadvertently contributed to the final key event of the battle. As 3d Parachute Battalion fell back, both MG Urquhart and BG Lathbury were forced to take refuge in an attic. In one instant, the division's two top commanders were denied the ability to command and control their forces.

Causes. MG Urquhart's presence so close to the front can be traced back to communications problems that had plagued the 1st Airborne Division from the beginning of the operation. The radios the British forces were using proved largely unreliable, rendering MG Urquhart unable to communicate with Major (MAJ) Freddie Gough, his reconnaissance battalion commander, or BG Lathbury and 1st Parachute Brigade.[29] Frustrated with his inability to monitor the progress

Photo courtesy of the Imperial War Museum, London No. HU 002127

The vital bridge at Arnhem after the British paratroops had been driven back. (German photograph)

of his main effort, MG Urquhart left his headquarters and eventually linked up with BG Lathbury, who was advancing with 3d Parachute Battalion. Communication problems had also forced BG Lathbury to leave his headquarters and join his main effort. When 3d Parachute Battalion's advance against KG *Spindler* was halted, BG Lathbury was wounded, forcing MG Urquhart to move him into a local residence, where both men became trapped behind an advancing German defensive line.[30] Ironically, the British communications problems could have been alleviated by effective use of the Dutch telephone system, which continued in service during the battle.

MG Urquhart's absence rendered his headquarters unable to give guidance at a critical decision point. As MG Urquhart joined 3d Parachute Battalion, LTC Frost's men reported finding a ferry west of Arnhem.[31] Securing the ferry could have negated the need to enter Arnhem, since it could have provided a viable crossing for the Allied ground forces. However, because it was not originally listed as an objective for LTC Frost, and because no command decision was issued after its discovery, the ferry was bypassed. Eventually a sympathetic local cut the ferry free so it would not fall into German hands.[32] More importantly, however, the loss of contact with MG Urquhart and BG Lathbury forced BG Hicks to assume command.[33] BG Hicks, who had been securing the DZs/LZs, lacked an accurate picture of the fighting in Arnhem and had to assume that reinforcing LTC Frost directly was the main effort. Thus he committed three battalions into a constricted, 200-meter corridor referred to as the Den Brink Area.[34] This would prove a costly mistake, first because the area was bordered to the north by high ground and to the south by the Rhine River, providing barely enough room for a company to maneuver, let alone three battalions.[35] Secondly, the Germans had already arrayed a devastating amount of force along the corridor. To the north, an AA company and an engineer battalion reinforced with heavy weapons occupied houses along the high ground. Along the southern bank of the river, a reconnaissance battalion with heavy weapons occupied a brickworks building. Both had excellent fields of fire over the Den Brink Area.[36] The three British battalions marched headlong into a defeat so costly that 1st Airborne Division would not have the manpower for another attempt at reinforcing LTC Frost.

Lesson Learned. The lesson from this event is the importance of communications in developing situational understanding on the battlefield, and the importance of positioning a commander so that he can best influence the fight. Leaders should lead as far forward as possible, but they must maintain adequate communications so that their forward position does not hinder their understanding of the big picture. Additionally, it emphasizes the necessity of performing proper precombat checks on all vital systems.

FM 6-0, *Mission Command: Command and Control of Army Forces*, discusses the importance of communications to commanders, stating that shortfalls must be corrected to provide full information in order to develop accurate situational understanding.[37] It advises that modern information systems can help commanders command forward without losing situational understanding.[38] However, without effective information flow, commanders at the front risk becoming overly focused on the fight immediately ahead of them and losing sight of the bigger picture.[39]

Summary

The 1st Airborne Division's plan in Operation Market Garden represented a tenuous balance between the chance of achieving a great tactical success and the risk of a crushing operational defeat. Although British paratroopers would be conducting a surprise attack against an unsuspecting and demoralized force, they would also be the furthest forward, isolated from the nearest ground forces by nearly 100 kilometers.[40] The Allied defeat was ultimately a result of failure to capitalize on initial tactical advantage. By placing the concerns of the air forces ahead of the ground tactical plan, the Allies sacrificed both the element of surprise and the ability to concentrate forces on the objective, allowing the Germans to slow the tempo of the battle almost to a halt. This, in turn, allowed the Germans to isolate the 1st Airborne Division logistically. As the Germans received a consistent flow of reinforcements and supply from the rear, the British grew dangerously short of men and resources. To compound problems, MG Urquhart was removed from the fight at a crucial point without having established a clear chain of command or leaving a clear intent with his headquarters. As a result, the 1st Airborne Division committed the bulk of its forces into a disastrous attack into the Den Brink Area. This resulted in a defeat so costly that the paratroopers had no choice but to form a defensive perimeter and endure through the painfully slow advance of the Allied ground forces. Unfortunately, the wait would prove too long for LTC Frost and the men of 2d Parachute Battalion. With casualties mounting, and ammunition, food, water, and medical supplies growing scarce, the battalion could hold out no longer. Almost all of its surviving Soldiers were taken prisoner.

Captain Hoyer, now with the 10th Mountain Division, has served as a platoon leader, battalion adjutant, and company executive officer at Fort Bragg, North Carolina. He has been deployed to both Afghanistan and Iraq. A graduate of the United States Military Academy, he has also completed the Engineer Officer Basic Course, the Engineer Captains Career Course, the Sapper Leader Course, and Jumpmaster School.

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[12] Stephen Badsey, *"Arnhem 1944, Operation Market Garden,"* Osprey Publishing Limited, London, 1993, p. 43.

[13] Clark, p. 100.

[14] Badsey, pp. 55, 59.

[15] Kershaw, p. 60.

[16] Ibid., p. 72.

[17] Ibid.

[18] Ibid., 71.

[19] FM 3-0, p. 5-7.

[20] Ibid.

[21] Kershaw, p. 71.

[22] Ibid., p. 115.

[23] Ibid., p. 103.

[24] Ibid., p. 113.

[25] Ibid., p. 73.

[26] Badsey, p. 85.

[27] Ibid., p. 57.

[28] Ibid., pp. 71, 76.

[29] Ibid., p. 43.

[30] Ibid., p. 49.

[31] Clark, p. 67.

[32] Ibid.

[33] Badsey, p. 54.

[34] Kershaw, p. 165.

[35] Ibid.

[36] Badsey, p. 25.

[37] FM 6-0, *Mission Command*, 11 August 2003, p. 3-17.

[38] Ibid., p. 4-26.

EARNING THE PRESIDENT'S HUNDRED TAB

By Major William J. Miller

The President's Hundred Tab is awarded to Soldiers for shooting exceptionally well with either the service pistol or rifle during the President's Hundred Match, an event that is held annually at Camp Perry, Ohio, during the months of July and August. The event is open to all Service members, as well as civilians and law enforcement personnel. The Civilian Marksmanship Program has overall control and responsibility for the competition. Each year, approximately 600 people register for the pistol match and 1,200 for the rifle match. Historically, this is a military match so only United States Army Service weapons that use iron sights with ball ammunition are allowed, although weapons should be match grade to be competitive.

Pistol shooters fire 40 bullets with either the M1911 (.45-caliber) or the M9 (9-millimeter) pistol held in one hand. There are three phases of the pistol competition: slow fire, timed fire, and rapid fire.

- During the slow-fire portion, competitors shoot ten bullets at 50 yards in 10 minutes, and then the shots are scored; this is repeated in a second round.
- During the timed-fire portion, the match transitions to the 25-yard line, where competitors shoot two strings of five bullets in 20 seconds. These shots are scored after ten shots.
- During the rapid-fire portion, competitors shoot another ten bullets, but in 10-second strings of five bullets each. Like before, the shots are scored after ten shots. The scores are tallied and the cut line is drawn.
- Usually, a score above 350 out of 400 will get a competitor near the cut line. The top 100 competitors are awarded the President's Hundred Tab with permanent orders. Soldiers wear the tab according to Army Regulation 670-1, *Wear and Appearance of Army Uniforms and Insignia*, paragraph 29-16c.

Rifle shooters can use any rifle made in the United States that was used by the military since the inception of the matches. Most competitive shooters compete with a match grade version of the M-16A2. The rifle competition consists of three phases.

- In the first phase, shooters are given 10 minutes to fire the first ten shots at 200 yards standing.
- In the second phase, shooters are given 70 seconds to fire ten shots at 300 yards. They begin in the standing position and move into the prone position, making a magazine change after the second bullet.
- In the third phase, shooters are given 10 minutes to fire ten shots at 600 yards in the prone position.
- Scoring is completed after each phase, and awards are handled the same as the pistol match. Usually, a score above 280 out of 300 will get a competitor near the cut line.

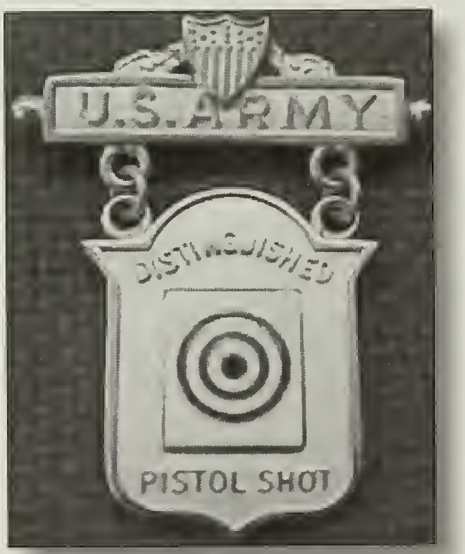
Soldiers are competing against all shooters, regardless of competency or whether they have already been awarded a tab. Soldiers can earn multiple President's Hundred Tabs throughout their career—for both pistol and rifle competition—although there is no difference in the tabs. Each year, 100 tabs are awarded for both the pistol and the rifle competitions during the President's Hundred Match. The winners of the matches receive several awards, one of which is a signed letter from the President of the United States. More information can be found at <*http://www.odcmp.com*>.

Major Miller is a student at the Command and General Staff College, Fort Leavenworth, Kansas. He has served in the 307th Engineer Battalion as a platoon leader, in the 44th Engineer Battalion in Korea as the supply officer and company commander, and in the United States Army Corps of Engineers as a construction program manager in Mobile, Alabama. He holds a bachelor's in mechanical engineering from the University of Iowa and a master's in engineering management from the University of Missouri-Rolla. An avid pistol and rifle shooter, he has been awarded the Excellence in Competition Pistol Shot (Bronze) Marksmanship Badge.

Earning the Distinguished Pistol Shot Badge

By Major William J. Miller

The fundamentals of marksmanship are some of the most important skills a Soldier will learn. The competitive marksmanship program, a long-standing tradition, was instituted in the aftermath of the Civil War by the United States Army. In 1884, General Phillip H. Sheridan formalized it when he designated distinguished marksmen with General Order 12. Originally, Soldiers could earn the Distinguished Marksmanship Badge with the rifle, pistol, or carbine. Eventually, the pistol competition separated itself from the rifle competition, and the first United States Army Distinguished Pistol Shot Badge was awarded in 1903. The United States Army Distinguished Rifleman Badge was created, and the Distinguished Marksmanship Badge was no longer awarded. The early badges, along with the Medal of Honor, were the only decorations authorized to be worn on the Army uniform. Although there are greater symbols of excellent marksmanship (such as the Distinguished International Shooter Badge or Olympic Medals), these distinguished badges can generally be earned by applying the fundamentals of marksmanship and remaining cool under pressure.



Distinguished Pistol Shot Badge

Excellence in Competition Points

Soldiers earn the Distinguished Pistol Shot Badge after earning 30 Excellence in Competition (EIC) points, also known as leg points or legs. These EIC points are earned through a series of specific marksmanship competitions held throughout the year and are cumulative in nature. After earning their first leg, Soldiers are awarded the Excellence in Competition Pistol Shot (Bronze) Marksmanship Badge, a permanent award accompanied by orders. It is only awarded from the commander of the Army Marksmanship Unit

(AMU) at Fort Benning, Georgia. The AMU maintains the records of approximately 25,000 Soldiers who have obtained EIC points at some point in their career for either the pistol or rifle.[1] Soldiers are awarded the Excellence in Competition Pistol Shot (Silver) Marksmanship Badge once 20 EIC points are earned.

Points are awarded based on the shooter's placement in a competition relative to other nondistinguished shooters. A nondistinguished shooter is one who hasn't earned the Distinguished Pistol Shot Badge. So, while the shooter may be competing against some of the best shooters in the country, who are more than likely already recipients of the distinguished pistol badge, a nondistinguished shooter will only be awarded legs based on his performance against other nondistinguished shooters. This was a condition that General Sheridan specified when he established the program to encourage new marksmen to compete and not get discouraged by the talents of more experienced marksmen.

For any of these EIC competitions, a Soldier will be awarded 6, 8, or 10 points based on his placement in the top 10 percent of nondistinguished shooters. In one competition geared toward introductory shooters at Fort Benning, Georgia, a shooter can only earn 4 points regardless of the placement in the top 10 percent, and the shooter must not have been awarded any pistol legs prior to the match. All National Guard State Championship matches are 4-point leg matches. Only the top 10 percent of nondistinguished match participants earn legs, and there must be at least ten nondistinguished Soldiers competing. Of the 10 percent, the top one-sixth earn ten points (also called gold placement or a gold leg), the next one-third earn eight points (silver placement or a silver leg), and the remaining one-half earn six points (bronze placement or a bronze leg). If there are going to be 100 nondistinguished shooters at a competition, then two gold, three silver, and five bronze legs will be awarded. If there are only ten nondistinguished competitors, then only one 6-point bronze leg will be awarded. It takes 25 nondistinguished competitors for the first 10-point gold leg to be awarded; there will also be one 8-point silver leg and a 6-point bronze leg awarded.

Courses of Fire Shot

There are two courses of fire shot for EIC competition: the combat pistol and bull's-eye courses of fire.

Combat Pistol Match. This match is shot with a standard rack grade M-9 pistol at a range of 15 meters with two hands on the pistol and in full field gear. There are two stages of fire: standing anti-body armor and standing quick-fire multiple engagements. The targets are figure 11 targets, showing an enemy soldier running forward with an AK-47 at the position of port arms.

- The standing anti-body armor course of fire requires the Soldier to shoot two bullets into the center scoring rings of the target and then one in the facial scoring area in 6 seconds. After a 6-second pause, this is repeated for three more targets with a pause between each target.
- The standing quick-fire multiple engagement course of fire requires the Soldier to shoot six bullets at four targets in 7 seconds and then 6 seconds with a pause in between. After quickly reloading, the Soldier fires six bullets at three targets (two in each) in 5 seconds and then 4 seconds, each with a pause in between.

Scoring occurs between the two stages of fire while targets are repaired or replaced. A total of 180 points is possible. To score legs, a Soldier should score higher than 145, but in some competitions it can be as low as 120—this depends on who's competing and range conditions. Scoring rings consist of a five ring out to a two ring (which is anything on the target), the facial scoring region is worth five points during the anti-body armor stage and two during the standing quick-fire stage. If the facial scoring ring is missed during the anti-body armor stage, then no points are awarded for that entire target. In the spirit of the competition, competitors are not allowed to shoot all rounds in the facial scoring region in order to ensure a higher probability of scoring points on that target.

Bull's-Eye Match. The bull's-eye or National Match Course of fire is shot one-handed with an M-9, M-11, or M-1911 pistol and in a modified garrison uniform. The pistols and ammunition can be rack or match grade depending on the competition rules. There are three stages of fire:

- The first stage requires the Soldier to shoot ten rounds at 50 yards in 10 minutes, and spotting scopes can be used to spot the impact of the round and adjust if needed.

Shooting kit

Primary Excellence in Competition Matches

Installation, United States Army Reserve, or Army National Guard State Championships

Fort Benning Pistol/Rifle Competition (Fort Benning, Georgia)

Currently Fort Benning is the only installation to conduct this level of competition specifically for active duty Soldiers. State-run competitions by the Army National Guard and United States Army Reserve are too numerous to list. This entry-level combat marksmanship competition, held in February, requires that competitors be stationed at Fort Benning or be a Reserve Officer Training Corps (ROTC) cadet from Georgia or Alabama. There are several competitions conducted during this match. Only four EIC points are awarded for a leg regardless of gold, silver, or bronze placement. To earn the points, a Soldier must not have any pistol EIC points.

United States Army Small Arms Championships

All-Army Pistol/Rifle Competition (Fort Benning, Georgia)

To compete in this competition, the shooter must be a member of the United States Army (Active, Reserve, or National Guard) or an Army cadet. This is a week-long combat pistol and rifle competition that is held in March. Pistol and rifle classes are taught by the AMU. There are several competitions conducted, one of which is the EIC match for rifle and pistol.

Major Command Championships

Joint Special Operations Command Pistol/Rifle Competition (Fort Bragg, North Carolina)

This is a week-long combat pistol and bull's-eye marksmanship competition in April. It is run similarly to the All-Army Competition, but with the added benefit of shooting a national match course of fire. It is one of the few competitions where two pistol EIC and two rifle EIC matches are shot.

First Army Commander's Warrior Challenge (Camp Bullis, Texas)

This good, all-around pistol and rifle competition is held in May and consists of a train-the-trainer course, practice firing, some team matches, and a foreign weapons competition. There are several competitions conducted, one of which is the EIC match for rifle and pistol.

Armed Forces Championships

Interservice Pistol Competition (Fort Benning, Georgia)

This combat and bull's-eye competition, held in June, is the best of the five Services' best, but any Service member is eligible. A 2700-type course is fired, with a Service pistol match and combat pistol match. The EIC match is a National Match 300-point bull's-eye match.

National Trophy Matches

National Trophy Pistol Match (Camp Perry, Ohio)

The best-of-the-best shooters in the country compete here (civilian, law enforcement, and military), but anyone is eligible to compete. It is run by the Civilian Marksmanship Program, and it is the national championship of bull's-eye shooting. With more than 600 people shooting in the pistol match, there are a lot of legs awarded.

National Guard Championships

Winston P. Wilson Pistol/Rifle Competition (Camp Robinson, Arkansas)

This competition is the National Guard Championship, but all branches can compete. The EIC matches are the combat pistol and rifle course of fire, and normally there are about 500 competitors. The competition is held in October.

- The second stage requires the Soldier to shoot a string of five rounds in 20 seconds two times with a controlled pause in between. On professional ranges, the targets will turn perpendicular to the shooter, but a pause can be instituted if range conditions don't allow for that.
- The third stage is the same as the second, except the strings are conducted in 10-second intervals.

Scoring occurs between each stage. A total of 300 points is possible. For this reason, the match is also called a "300 match." To earn a leg, Soldiers generally need to score above 260 points—this can vary considerably based on the skill level of the competitors. The targets are National Rifle Association (NRA) type B6 (50 yards) and B8 (25 yards) targets. Scoring rings consist of a bull's-eye or "X" ring, a ten ring to a five ring.

Sanctioned Matches

There are only certain sanctioned matches that Soldiers can compete in to earn their legs each year. These matches can either be bull's-eye or combat pistol, but must be classified as an EIC match. A Soldier can only shoot in four rifle and four pistol EIC matches a year, regardless if it is an Army or alternative match. Visit <*www.usaac.army.mil/amu*> to view upcoming Army EIC matches on the AMU website.

Primary Matches. The table on page 70 lists the primary matches where Soldiers can earn EIC points.

Secondary Matches. Every branch of the military, the United States Coast Guard, and civilians, through the Civilian Marksmanship Program, have their own competitive marksmanship program with their distinctive awards program. Because of this, there are several secondary matches for Soldiers to earn EIC points; however, Soldiers can only earn 20 EIC points from non-Army competitions. If Major Army Command (Joint Special Operations Command or 1st Army), All-Army, or Interservice Championships are missed, alternate matches can be authorized in advance through the AMU on a one-for-one basis after missing one of the primary matches. This procedure is an exception and must be coordinated with the AMU, otherwise hard-earned legs from non-Army matches may not count toward the Soldier's Distinguished Pistol Shot Badge. Only two alternative matches can be shot per year, of which only one can be a civilian match. Some of the more popular alternative matches that Soldiers can compete in for pistol EIC points are:

- Atlantic Fleet Forces Command Pistol Matches (Virginia Beach, Virginia)
- Pacific Fleet Forces Command Pistol Matches (Camp Pendleton, California)
- All-Navy (East Coast) Pistol Championships (Virginia Beach, Virginia)
- All-Navy (West Coast) Pistol Competition (Camp Pendleton, California)
- Civilian Matches certified by the Civilian Marksmanship Program

All of the marksmanship badges are worn in the same manner as other standard Army marksmanship badges. The reference for wearing these badges can be found in Army Regulation 670-1, *Wear and Appearance of Army Uniforms and Insignia*, paragraph 29-16. Army Regulation 350-66, *Army-Wide Small Arms Competitive Marksmanship*, governs EIC points and procedures.

Summary

Visit <*www.odcmp.com*> to view all civilian and most military EIC matches available to compete in; Navy Marksmanship Team information can be found at <*http://www.usnst.org*>.

Earning your Distinguished Pistol Shot Badge is a rare occurrence and a very high honor. The process can be accomplished quickly with the Soldier scoring gold legs in three competitions or can take as long as a full career. As of 5 March 2008, there were 1,709 Distinguished Pistol Shot Badges awarded to Army personnel since 1903, with 375 "double" distinguished in both weapons and 14 "triple" distinguished (rifle, pistol, and international).[2]

The highest-ranking Soldier to wear the badge is General John J. Pershing, who earned the Distinguished Marksmanship Badge with the rifle and pistol before the Distinguished Pistol Shot Badge was created. General Lyman L. Lemnitzer, who later became the Chief of Staff of the Army, earned the Distinguished Marksmanship Badge (Rifle). Brigadier General Claudius Easley earned his Distinguished Marksmanship Badge (Rifle), and later as the Assistant Division Commander of the 96th Infantry Division declared the division the "Deadeyes" because of their proficiency with the rifle. A known distance rifle range at Fort Benning is also named in General Easley's honor. The highest-ranking engineer to wear the Distinguished Pistol Shot Badge was Major General Hugh J. Casey, General Douglas MacArthur's chief engineer; he also earned his Distinguished Marksmanship Badge (Rifle). One engineer, Lieutenant Colonel Rhonda Bright, earned her triple designation (pistol, rifle, and international) in 2006. She is the second woman in the Army to achieve this honor and one of 14 in the Army to ever reach this goal.

Major Miller is a student at the Command and General Staff College, Fort Leavenworth, Kansas. He has served in the 307th Engineer Battalion as a platoon leader, in the 44th Engineer Battalion in Korea as the supply officer and company commander, and in the United States Army Corps of Engineers as a construction program manager in Mobile, Alabama. He holds a bachelor's in mechanical engineering from the University of Iowa and a master's in engineering management from the University of Missouri-Rolla. An avid pistol and rifle shooter, he has been awarded the Excellence in Competition Pistol Shot (Bronze) Marksmanship Badge.

Endnotes

[1] Information obtained from Nancy Pool, the United States Army's Excellence in Competition (EIC) awards program manager and a member of the United States Army Marksmanship Unit at Fort Benning, Georgia.

[2] Pool.

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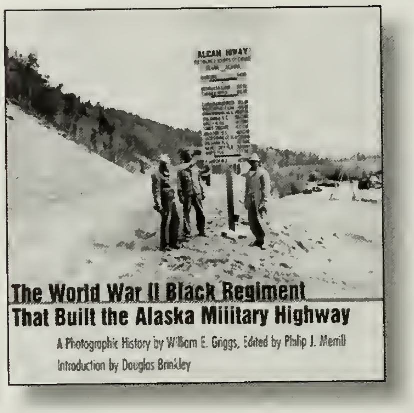
Book Reviews


ALCAN HIWAY
The World War II Black Regiment
That Built the Alaska Military Highway
A Photographic History by William E. Griggs, Edited by Philip J. Merrill
Introduction by Douglas Brinkley

The World War II Black Regiment That Built the Alaska Military Highway: A Photographic History, by William E. Griggs, University Press of Mississippi: Jackson, 2002, 112 pages, ISBN 1-57806-504-6, $45.00 (hardcover).

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Often compared in its engineering difficulty to building the Panama Canal, construction of the Alaska-Canada (Alcan) Highway—covering 1,523 miles—was completed in just over eight months in 1942, in large part by four black regiments of the Corps of Engineers. William E. Griggs, regimental photographer of the 97th Engineers, has captured his journey in *The World War II Black Regiment That Built the Alaska Military Highway: A Photographic History*. His book pays tribute to the men whose efforts on the Alcan Highway went unrecognized for 50 years.

In what Douglas Brinkley hails in his introduction as the "greatest engineering feat of the Second World War," the 97th finished its 194-mile section more than a year ahead of schedule, despite the severity of extreme weather; mosquitoes, mud, permafrost, and muskeg; segregation issues; and inadequate clothing and shelter—especially harsh for men who had entered the Corps in the Deep South.

The urgency in building this military road was due to the 1941 Japanese attack on Pearl Harbor and later takeover of two islands at the tip of the Aleutian Chain. Since Alaska's invasion seemed imminent, building a supply line became a priority. Even though the Japanese were successfully routed from the Aleutian Islands, the Alcan Highway was effectively used to transport thousands of airplanes to Russia via Nome and Fairbanks during World War II.

Each black regiment was assigned of a portion of the highway to complete. The 97th constructed the northern Alaska section, with its sharper extremes in temperature: -70 degrees in winter and in the 90s during summer when, due to Alaska's long days, work continued nonstop in shifts. The only two fatalities in the regiment involved a shooting and a Soldier freezing to death.

The engineers had surveyors working ten miles ahead of bulldozers that razed trees and cleared the path. In periods of thaw, vehicles got stuck in the mud constantly, requiring construction of corduroy roads (layers of logs, gravel, and sand) for traction. Boggy land—called *muskeg*, arising from permafrost conditions in Alaska—is moist soil laden with moss and dead plants, and in spring it behaves like quicksand for vehicles. This, coupled with the substandard equipment the black regiments received, made their achievement of completing the highway ahead of schedule a marvel.

African Americans represented about one-third of the troops sent to work on the highway. The U.S. Army was finally racially integrated in 1948 by Executive Order of President Harry Truman. However, during construction of the Alcan, the Army's black Corps of Engineers, always working under white officers, endured prejudice and substandard treatment. For example, they received unserviceable trucks destined for salvage and clothing unsuitable for the harsh climate, as well as cloth tents to be used only in the wilderness—unlike their white counterparts, who resided in Quonset® huts within air bases or populated civilian areas.

Griggs has written captions for his nearly 100 black-and-white photographs which, in addition to showing the camaraderie of the engineers, are understated testaments to their strong work ethic and tenacity to get the job done. One caption opines that these pictures of the 97th are the only *formal* photographs of *any* black regimental Soldiers who worked on the Alcan Highway. There are pictures of Soldiers on a troop train heading for embarkation from Seattle; sunken mud-bound trucks; a Soldier holding up fresh salmon for the regiment's pet bear cub; engineers creating corduroy roads over mud and muskeg; bridge construction across waterways; and a penultimate moment of the author shaking hands with a bulldozer operator on the Alaska-Canada border—before the 97th continued 20 miles beyond their assignment, into Canada, to meet the oncoming white regiment.

As regimental photographer, Griggs managed to get himself into many of the photos. Though he was doing an assignment, his pictures are more elemental, and elegant, in their storytelling. As Brinkley observes once again, "None . . . [of the other extant publications on these men] offer what Griggs's does: an honest matrix of memorable images documenting the raw, unfiltered experiences of black [S]oldiers at work in a segregated army."

Consider: These engineers had to use pickaxes to chop away any glaciers they didn't build around. They lived isolated in tent cities in subzero weather. In winter, they left trucks running all night or placed torches underneath them so they would start. Supplies were dropped to them by parachute. More effective than any straight narrative can be, pictures like these leave one incredulous at the engineering effort required in such an environment. Consider the splendor of their ordeal, since you as the reader will—guaranteed—regard highly the men of the 97th Regiment by the end of this photographic essay.

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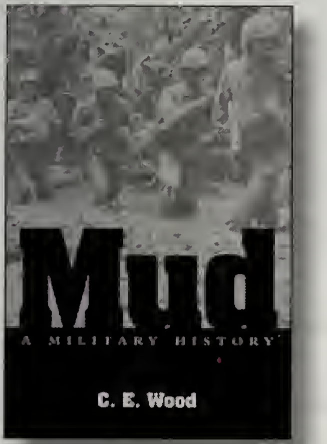

Mud: A Military History, by C. E. Wood, Potomac Books, Inc.: Washington, DC, 2006, 190 pages, ISBN 1-57488-984-2, $23.95 (hardcover).

• • • • •

In military operations, mud can be—well, a quagmire. But its presence confers both hindrance and advantage, as C. E. Wood points out in his book *Mud: A Military History*. Alternating harrowing and humorous aspects taken from interviews, memoirs, and historical records, the author explores the character of mud and its effects on warfare in North America, Europe, and Asia in the past few centuries, with archival photos accenting mud's significance.

It isn't just mobility that is affected by an oozing, slippery earth; the very morale of warfighters sinks too, in trying to gain some ground. As first-person accounts reveal, mud provokes anger and frustration by underscoring the general distress of staying wet and dirty. The author conjures images of combatants encased in heavy, crusty mud and has the reader consider not only their discomfort, but mud's deterioration of their clothing and boots as well. Basing his early chapters on how mud can assert itself during wars—permanent mud (marshes), seasonal mud (areas of excessive intermittent rainfall), and random mud (regions of thaw or unpredictable rain)—Wood devotes the remaining sections to mud's impact on engineers, health, morale, fatigue, and wear and tear.

Mud's *characteristics* include softness, adhesiveness, and slipperiness (which can even remove the advantage of tracked and all-wheel vehicles in staying on the road); mud's *effects* are churnability (how forces can make more mud by disturbing it), capacity to dampen explosives, and ability to create suction. In an example of this latter effect, engineers in Vietnam had to use explosives to loosen the vacuum under mud-bound retriever tanks. Helicopters also fall prey to the powerful suction of mud as they ascend from it.

But mud has its virtues: A sleeping soldier whose leg was run over by a vehicle was only bruised, due to the soft mud beneath him. An Army medic who jumped out of a helicopter in Vietnam lived, since he landed in mud. A parachutist in World War II survived when his airplane ran out of fuel over China and he fell into mud next to a rice paddy.

Counterbalancing the *hazards* of mud on a battlefield—such as its slipperiness and suction, soil bacteria (specifically, tetanus and anthrax) that can infect wounds, and gas gangrene (from soil containing bacillus of horse manure)—the author includes a surprising number of mud's *benefits*. It can serve as a poultice for wounds, a mudpack to discourage insects like red ants and gnats, a layer on clothing for warmth, a source of moisture placed on the tongue in inordinately hot weather—despite the bacterial content, which is especially virulent due to mud's plasticity. Additionally, stories of mud used for camouflage and concealment in Vietnam, the Spanish-American War, the Crimean War, and the war in Afghanistan are detailed by the author.

In the chapter "Mud and Engineers," Wood discusses the use of corduroy roads in muddy areas; these engineer-built log roads were used, for example, by Germans in Russian swamps. A variant of corduroy roads by the South Vietnamese, using banana fronds and laterite (a clay-like substance with heavy iron deposits), was put to good use by American engineers in Vietnam. The author points out that in muddy conditions additional engineers are always needed, and they must keep adding construction materials (such as bricks or logs) nonstop to the sloughy surface to assure mobility.

Mud in wartime hides elements that contribute to its fetid quality—human and other animal bodies in decay, waste materials, sunken military equipment with its toxic liquids, and warfighting chemicals. This side of war, perhaps unconsidered by the general populace, is part of Wood's environmental discussion. The difficulty of evacuating casualties, already an exhausting and slippery business in mud, can be compounded by treacherous elements just beneath it.

Trenchfoot (now called immersion foot)—a concomitant of water plus cold temperatures, and which can lead to gangrene—was rampant in World War II, when combatants often stood in water for hours on end. As doctors performed surgery while standing in bunkers, water seeped through the ceiling and rose higher on the ground inside, often up to their knees. Attempts to keep feet dry in the field included digging trenches around warfighters and filling entrenchments with stones to stand on. Many trials were conducted to produce a waterproof boot for prevention of trenchfoot, but Wood notes that most solutions were primitive or ineffective (rawhide), poor in quality (English shoes that fell apart), or impracticable (wooden boards strapped to boots) until a waterproof thigh boot was issued in 1915. Civil War Soldiers were often shoeless as they marched in mud and suffered many foot maladies.

The attributes and consequences of mud are quite shocking in their full delineation by Wood. How many people (before reading this book) would have considered that when mud is knee-high, extraction of oneself is possible—whereas when it rises to thigh level, mere suction often prevents escape? Wood cites accounts of men drowning in mud, with those around them helpless to assist. The author even discusses the awful associations the military have with dying in the mud, and how their compatriots will lift a fallen person above it to carry the corpse to dry ground; dignity issues abound in an environment fostering what might be called an ignoble death.

And yet, Wood's humor is pervasive, as in references to "mud's dirty tricks" and the weather's steel-trap tendency to change dirt to mud at the defining moment of an army's tactics. In an odd anecdote, Soldiers told of experiencing a thwarting "mud rain" in Iraq in 2003 as rain embraced sandstorm particles, producing slick mud that coated all as it fell.

What makes *Mud: A Military History* unusual is its easy readability along with technical relevance for military engineers and planners. Yet it is written with a literary flair and has a naturalistic quality in its unblinking realism.

This book may be the first to address mud's impact on the psyche—the morale, health, and sustained effort of warfighters while their operations go forward. As the author points out, mud either prevents or offsets this forward movement in battle. Among his written sources, he cites as the "best" reference Harold A. Winters' *Battling the Elements*, a study of mud and mobility during the Civil War, World War I, and World War II. As a former Marine and Soldier, C. E. Wood has carefully crafted a book on an aspect of environment in wartime: the behavior of mud, and those individuals having to reconcile themselves to it.

Reviewed by Susan Stevens, currently a Department of the Army Intern in Instructional Design in the Maneuver Support Center Directorate of Training, Fort Leonard Wood, Missouri. Her background includes a civil service career in various federal agencies and teaching English, literature, and creative writing at high school and college levels.

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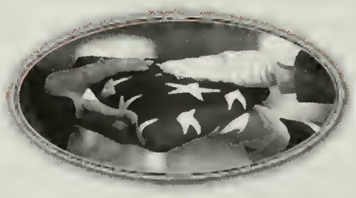


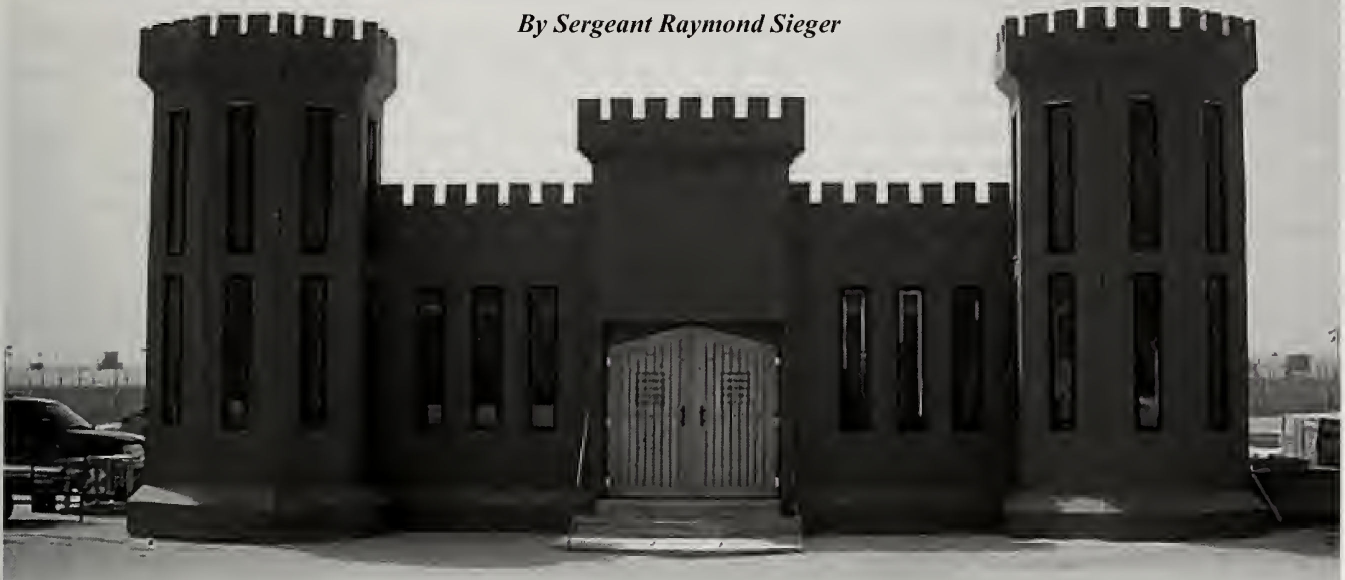
Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Allmon, Sergeant William E.	1st Battalion, 64th Armor Regiment, 2d Brigade Combat Team	Fort Stewart, Georgia
Buxbaum, Specialist Justin L.	62d Engineer Battalion, 36th Engineer Brigade	Fort Hood, Texas
Dhanoolal, Sergeant Dayne D.	2d Battalion, 69th Armor Regiment, 3d Brigade Combat Team	Fort Benning, Georgia
Dix, Specialist William T.	14th Engineer Battalion, 555th Engineer Brigade, I Corps	Fort Lewis, Washington
Gonzalez, Specialist Alex D.	43d Engineer Company, 3d Armored Cavalry Regiment	Fort Hood, Texas
Kanakaole, Private Eugene	87th Engineer Company, 8th Battalion, 36th Brigade	Fort Hood, Texas
Marion, Private First Class Adam L.	171st Engineer Company, North Carolina Army National Guard	Saint Pauls, North Carolina
McNeal, Staff Sergeant Jeremiah E.	237th Engineer Company, 276th Engineer Battalion	West Point, Virginia
Richard III, Sergeant Joseph A.	4th Brigade Special Troops Battalion, 4th Brigade Combat Team	Fort Polk, Louisiana

The Castle at Camp Bucca

By Sergeant Raymond Sieger



During their Operation Iraqi Freedom deployment at Camp Bucca, Iraq, engineer Soldiers of the 310th Military Police Battalion's repair and utility (R&U) section chose a unique way to honor their Army branch. They constructed a building with a façade in the form of the Army engineer castle as a way to honor Army engineers who had fallen in the wars in Iraq and Afghanistan.

Two weeks after arriving at Camp Bucca and setting up shop, Soldiers in the section learned that they needed to vacate the existing shop to make room for another arriving unit. With no other building available, they were told by the forward operations base (FOB) field engineering team that land would be set aside for them but that they would have to build their own shop. As one of the section's noncommissioned officers (NCOs) designed and drew up blueprints for the new building, other team members set out to build a temporary building to secure their equipment. This 500-square foot structure would also serve as a training tool to teach team members with other military occupational specialties the basic carpentry skills they would need when it came time to build the much larger permanent structure.

The Castle gets a coat of red paint.

In spare time outside the section's duties of building and maintaining the camp's theater internment facility, the Soldiers built the "Engineer Castle" in 19 days over the course of 3 months. Considering the quality and availability of lumber in Iraq and the size and complexity of the façade, the building was a monumental achievement for the section. In the end, it became a landmark on the FOB, even for approaching aircraft since it was directly in the flight path of incoming helicopters. With its detailed design and brilliant color, there was nothing like it in all of Iraq.

The towers on each side were intended as offices for the engineer officer and the NCO in charge, while the remainder of the building was to be used for shop and tool storage areas. In the rear was a covered saw deck for large projects. However, since the building was not considered an FOB asset, it was never included in the FOB power plan, and the original aims were never realized. Ironically, just 5 days before the 310th was due to redeploy to the states, the building burned to the ground when a generator placed close to the saw deck by the replacement unit caught fire. The building was to be dedicated with a memorial plaque donated by the vendor responsible for most of the materials used in the construction. The structure may be gone, but its memory and purpose will live forever in the hearts and minds of the Soldiers of the 310th Military Police Battalion and all those who served at Camp Bucca while the castle stood.

Sergeant Sieger was the R&U section leader while deployed with the 310th Military Police Battalion. He joined the Army in 1974 and left in 1987, when he enlisted in the Navy and served as a corpsman until 1994. He joined the Army Reserve in 2004 as an engineer. In his civilian job, he is a land acquisition project manager with a national home builder.

Engineer Update

Maneuver Support Center (MANSCEN) and Engineer School Lessons Learned Integration (L2I) Cell. MANSCEN and the United States Army Engineer School L2I Cell need your help. To keep training, doctrine, and combat developments current and to prepare for the future, it is critical that the school continuously receive relevant engineer observations, insights, and lessons (OIL). The L2I analyst can derive information from a variety of sources: unit after-action reports (AARs); tactics, techniques, and procedures (TTP) used by units in and returning from theater; Soldier observations/submissions to the Engineer School; and requests for information (RFIs). This information is used to conduct doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) gap analyses and to determine solutions. These solutions are distributed to the Engineer Regiment via new doctrine and training products, *Engineer* (The Professional Bulletin of Army Engineers) and other publications, websites, and by answering RFIs. With the modular transformation in full swing, many engineer units are looking for sample tactical standing operating procedures (TACSOPs) for the new units being established. You can help by forwarding any of these materials from your unit's deployment to the L2I analyst. Unclassified information can be sent to <*donald.mark.perry@conus.army.mil*>. Classified information can be sent by secure Internet protocol, routed (SIPR) e-mail to <*donald.mark.perry@conus.army.smil.mil*>. For more information, call (573) 563-5340/3820.

* * *

2008 Engineer Unit Directory. The 2008 United States Army Engineer Unit Directory is available online in Adobe PDF format at <*http://www.wood.army.mil/engrmag/Engr%20Unit%20Dir/2007Directoryonline.pdf*>. Since many unit addresses have changed recently, take a moment and see if your unit's listing is correct. Changes to the Unit Directory can be made by calling (573) 563-7644 or e-mailing <*leon.engineer@conus.army.mil*>.

(*"DPW in Iraq," continued from page 55*)

U.S. civilians would fill the critical roles of obligating funds, whereas vetted local nationals or expatriates could perform roles such as construction inspection and engineering design. The DPW would be in support of the COB mayor's section but not in its chain of command, providing the independence of operation required by the facility engineers.

The skills required for these positions already exist in the United States Army Facility Engineer Group (FEG), which is scheduled to begin reorganization in fiscal year 2009. Currently, all the FETs and facility engineer detachments in the Army are assigned to the FEG. The new force structure would provide the 412th and 416th Engineer Commands with a pool of skilled personnel to fill these positions.

Sustaining Facility Engineer Skills

As this operation has illustrated, the Engineer Regiment must provide maneuver commanders with officers who have facility engineering skills to help construct COPs and FOBs. With the deactivation of the FEG, the intellectual capital of this organization will be lost if it is not captured by a new organization. The United States Army Engineer School must recognize this and work with the FEG to acquire the lessons learned, DPW workshop lesson plans, and other key information before it is lost. The position of facility construction contract management engineer should be on the brigade and division engineer staffs. The skills required for the position include—

- Using the Theater Construction Management System.
- Estimating costs.
- Writing specifications.
- Managing contracts.

Positions on the G7 staff should focus on MILCON program development as well as warfighting. The leadership should recognize that the skills required for these positions are developed through pertinent assignments and not through course work alone.

Lieutenant Colonel Kniesler, United States Army Reserve (USAR), is commander of the 673d Facilities Engineer Detachment and was officer in charge of the construction management section of the 20th Engineer Brigade at LSA Anaconda. While on active duty, he served as a mechanized platoon leader and company commander with the 7th Engineer Battalion, 5th Infantry Division at Fort Polk, Louisiana; as deputy area facility engineer at Camp Casey, Republic of Korea; and as Commander, 642d Combat Support Equipment Company, Fort Devens, Massachussetts. In the USAR, he has been assigned to the 78th Training Division and the Army Staff in the Office of the Chief of Engineers (Pentagon) and is currently with the 673d FED. His civilian job is director of new construction for Mount St. Mary's University in Maryland. He has a bachelor's in architecture from Catholic University.

Leadership Development

Multi-Source Assessment and Feedback (MSAF) Program

The Center for Army Leadership has launched the Multi-Source Assessment and Feedback (MSAF) program, a confidential and focused online assessment tool for individual leader development. MSAF provides individual feedback to leaders related to the eight leadership competencies described in FM 6-22, *Army Leadership*. MSAF applies to all domains of training and education (self-development, institutional, and operational), all cohorts (officers and warrant officers, noncommissioned officers, and Army civilians), as well as both Active Army and Reserve Component (RC) personnel.

Individuals will be required to initiate an assessment prior to attending Professional Military Education (PME) or Civilian Education System (CES) courses. For organizations within the operating force, Active Army brigades will be scheduled every three years to participate in the program and RC brigades every six years. Organizations within the generating force are scheduled every five years. Individuals may use the MSAF at other times on their own initiative for self-development purposes. MSAF assessment instruments and feedback accessed through the My Leader Development section on AKO or by logging on to <*https://msaf.army.mil*>.

For more information, contact Mr. Howard Brewington at (913) 758-3174.

Developmental Counseling Course

The Center for Army Leadership has recently released a new online course for all Army leaders on Developmental Counseling. This course consists of three modules, totaling approximately eleven hours of instruction. The modules cover types of counseling, leaders as counselors, and the counseling process.

FM 6-22, *Army Leadership*, the Army's newest leadership doctrine, states that "counseling is one of the most important leadership development responsibilities for Army leaders." This counseling course is one way for leaders to hone their counseling skills and to help prepare for greater responsibility. Since the course is online, Army leaders may work on the course at a time and place that are convenient to them.

There are two important reasons to improve counseling skills. First, counseling is one of the most important ways to develop subordinates. Second, counseling helps the leader and Soldier to come to a common understanding about the mission and how it needs to be accomplished.

The Developmental Counseling Course and FM 6-22 are both available on the Combined Arms Center website at <*http://usacac.army.mil/cac2/digitalpublications.asp*>.

For more information, contact Dr. Jon Fallesen at (913) 758-3160.

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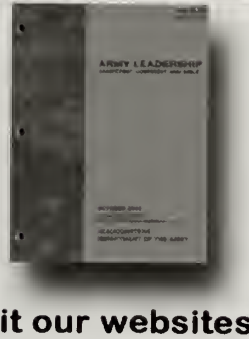

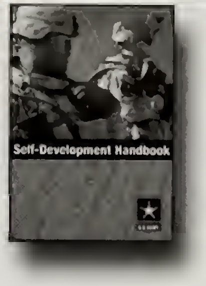

Visit our websites for leadership publications, information, discussion, and more leadership links.

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Clear The Way

By Brigadier General (P) Gregg F. Martin
Commandant, United States Army Engineer School

Teammates: On 8 October 2008—a gorgeous Fall day in the Ozarks—the MANSCEN CG, MG McCoy, passed the Engineer Commandant Colors from me to COL Bob Tipton. It has been the greatest of honors to have served as your Commandant for the past year. This has been an awesome endeavor for Maggie and me, and we have loved every minute of serving with and for you all!

While fighting in two theaters and conducting full spectrum operations worldwide, our Regiment has been magnificent! From tip-of-the-spear Sapper and counter-IED missions, across the total range of our many engineer roles and functions throughout the depth and space of the operational environment, to national-level reconstruction operations, our Regiment provides an absolutely critical capability for our Army, Joint Force and Nation. Simultaneously, we have TRAINED, educated and helped develop more than 20,000 new engineer Soldiers and leaders; SUPPORTED our deploying and deployed forces; continued TRANSFORMING ourselves into the Modular Engineer Force; CARED for each other and our Families; and ENGAGED key stakeholders—all for the good of our Army!

We are One Engineer Regimental Team of Teams, comprised of more than 70,000 uniformed engineer Soldiers and more than 30,000 DA Civilians, as well as academic colleagues, alumni, contractors, Families, and more… We are in great demand around the world—everyone wants more engineers and the capabilities we provide so well. Yet, in our resource-constrained environment, it is unlikely that we will see any significant increase in resources, if any at all, in the foreseeable future...Thus, it is encumbent upon us to innovate and adapt across all the DOTMLPF domains—developing new ways to team with each other, as well as our joint, interagency, intergovernmental, and multinational (JIIM) partners—leveraging each others' strengths and capabilities in order to mitigate and overcome our gaps and shortfalls. A great example of this is the development of our Field Force Engineering concept over the past decade and the unprecedented level of collaboration between the troop and USACE elements of the Regiment. Another example is our Joint Engineer Operations Course (JEOC) and the unprecedented level of Joint Engineering we have seen develop over the past several years. There is much untapped potential that we must explore and develop.

The recently completed Collection and Analysis Team (CAAT) project in Iraq will be a great help in validating our requirements. Thanks to COLs Tipton and DeLuca and teams for orchestrating and executing this critical mission so well. The officially sanctioned CALL report should be published soon.

On the Building Great Engineers (BGE) front, we've had an awesome run since the last Engineer Bulletin. We've executed significant Stratcomms/Engagement events at USMA, both the Engineer Expo (to encourage underclassmen to major in engineering) and the Combat Leader Seminar and Branch Day (to inform, educate, and encourage senior cadets to consider choosing our branch); the USACE Leaders Emeritus conference, where we updated and informed the grey beards and senior leaders; the Army War College; Tufts University; and MIT AROTC.

Many of you have been conducting similar events as well. Special thanks and a big Hooah to MG Bo Temple, who has been a one-man, bone-crushing force at numerous schools and events throughout Virginia!!! I encourage you all to get engaged and go tell your and our engineer story. We have a comprehensive Stratcomms push package available on our website for your use.

I also had the great opportunity to travel to Iraq with the Chief and see a number of you. Although I would like to have stayed longer and to have seen every one of you, it was a great visit, and I was extremely impressed with what you are doing and achieving.

Although it was with a heavy heart that I passed the Engineer Colors, I am thrilled that COL Bob Tipton is now our Engineer Commandant. Bob is a combat-hardened, seasoned professional, with enormous full spectrum engineer experience—in short, a Great Engineer!!! Bob and Carol are the perfect command team to continue the momentum and lead our Regiment to the next level. I know you will give COL Tipton and our world-class team at the Engineer School the same enthusiastic, passionate, candid, and professional support that you gave me.

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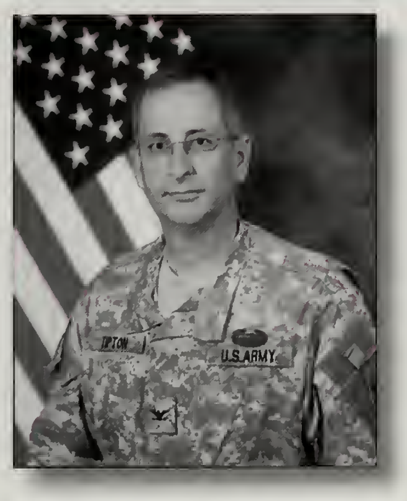
Clear The Way

By Colonel Robert A. Tipton
Commandant, United States Army Engineer School

What an unbelievable honor to serve as the Engineer School Commandant and to lead our Regiment's efforts in so many areas. In late August, we were given the great news that BG Martin had been selected for promotion and would take over as the Commanding General of the Maneuver Support Center (MANSCEN). While it is tough for the Regiment to lose this "Great Engineer" as our Commandant, it is good news for MANSCEN because the passion and energy that he brought to our Regiment will certainly take MANSCEN to the next level. These will be tough boots to fill!



However, the new CG is not the only change that has occurred here in the past year. There have been a lot of changes at the school house and MANSCEN that have had a huge impact on our Regiment. Last year, MANSCEN converted to the TRADOC Center of Excellence model that transformed the way we develop capabilities for the Regiment. During the early stages of this transformation, the Engineer School and MANSCEN had to overcome a lot of obstacles to establish the systems to support this new way of doing business. I am happy to report to you that new systems and processes are beginning to take hold that will help shape the Regiment to better support our Army.

The Center of Excellence model calls for MANSCEN to be the lead for capabilities development (doctrine, organizations, and materiel) and for the Engineer School to focus on training and leader development. The missing piece for the school was that while MANSCEN is responsible for capabilities development, the Engineer School still has a tremendous role to play in shaping capabilities development as the subject matter expert for the Engineer Regiment and to be the link between MANSCEN and the engineers in the operational Army—a role we were not staffed to do after the transition of our combat developers to MANSCEN. As a result of this shortcoming, we developed a new position in the school to address this gap and hired Mr. Jim Rowan, who many of you know, as our new civilian Deputy Assistant Commandant. Jim is no stranger to the Regiment or the Engineer School, and he made an instant impact and is the field's direct link to engineer-related capabilities development within MANSCEN. In addition to bringing on Mr. Rowan, we have formalized the collaboration between the school house, the Office of the Chief of Engineers in the Pentagon, and our engineer integrators in the G-3 and G-8, along with other key engineer positions at the Army level. This increased collaboration will ensure that we articulate our engineer equities to better support our Regiment, the maneuver support community, and the Army.

We have also improved our collaboration tools to allow you to better connect with the school house. See Mr. Doug Fowler's article on the Engineer School Knowledge Network (ESKN) <*https://www.us.army.mil/suite/page/126*> on page 21. Please understand that the public website is intended for our external stakeholders and will be much less dynamic than ESKN and will not contain products for downloading. We will, however, use the public website to post all information on ENFORCE (more on that later).

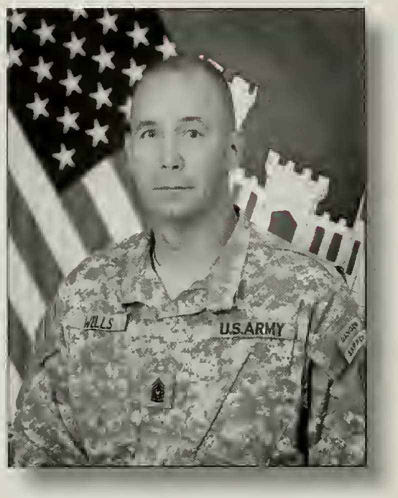
In September, I was indeed fortunate to lead a great team of engineers into Iraq as part of the Center for Army Lessons Learned (CALL) to conduct an Engineer and Base Camp Collection and Analysis Team (CAAT). As a result of this trip, we collected a tremendous amount of great feedback that was recently published online by CALL. We specifically looked at the challenges we are facing as a Regiment in the areas of engineer command and control, engineer leader technical competencies, the engineer role in building capacity in support of stability operations, route clearance, and an in-depth look at base camps in the Iraqi theater. We are using the results of this document to support ongoing and new solutions being worked by MANSCEN and others to address the identified gaps. The team outbriefed the CAC leadership in October and also provided an outbrief at the 20th Engineer Brigade Lessons Learned Conference in December. Many thanks to the 20th Engineer Brigade, 926th Engineer Brigade, 18th Engineer Brigade, the MNC-I C7 Staff and all the phenomenal engineers working in-theater for supporting this very important effort.

The past few months have also seen some significant changes to the regiment as well. In October, the 4th Maneuver Enhancement Brigade (MEB) uncased it colors and assumed training and readiness oversight (TRO) responsibilities for the 94th and 5th Engineer Battalions at Fort Leonard Wood.

(Continued on page 19)

Lead The Way

By Command Sergeant Major Robert J. Wells
United States Army Engineer School



Developing junior NCOs is the number one priority for senior NCOs in our formation. First of all, we owe it to the newly inducted NCOs, and it begins with telling them what our expectations are. One of the first things we should say to them is "As the newest member of the NCO Corps, I expect you to be, know, and enforce the following standards we've laid out in our unit. These standards will help you maintain discipline in your team. This is what right looks like."

The young NCOs will already have a good idea of what's expected of them, just from observing the NCOs in the platoon. But now we have to show them the art behind the science of leading Soldiers in garrison and in combat. And it's a long process that can't be completed in a simple counseling session. The senior NCO's responsibility goes way beyond that. I tell newly graduated Soldiers from the Warrior Leaders Course that I don't expect them to be the masters of all facets in leading a team or a squad right away, but I do expect them to be the masters one year from now. There's a lot of paddling going on under the water that first year, and it takes the squad leader, platoon sergeant, and first sergeant to keep them on the right path.

I can't say it any better than our own Sergeant Major of the Army, CSM Kenneth O. Preston.

"To understand how standards and discipline are related, you have to start with the basic premise of how we grow sergeants in the Army. This is a basic three-step process:"

"Step One is to establish a standard. The items we wear on the uniform or carry with us is a standard, usually according to a unit SOP. The preventive maintenance checks and services (PMCS) we perform on our HMMWV in the motor pool are done to a standard outlined in the operator's manual. A patrol of Soldiers coming off mission in Baghdad, Iraq, clear their weapons upon entering their base camp according to the standard published in the weapons handling procedures developed by the Safety Center."

"Now with an understanding of standards, Step Two is to put someone in charge of enforcing the standards. This is where the sergeant is now responsible for his or her piece of the Army—those three or four Soldiers. It is the sergeant who conducts daily inspections of Soldiers' uniforms. It is the sergeant who conducts precombat checks (PCC) of his or her Soldiers' arms and equipment before going out on patrol... ."

"Step Three in growing our leaders is to hold the sergeant accountable. This is where the more senior leaders above the sergeant have their responsibility. To see what is being done to standard, senior leaders have to inspect."

Okay, now why don't our senior NCOs help develop the junior NCOs? Here's an example: I was watching a PFC in the gunner's hatch of an M1151, obviously having problems with his M2 machine gun. I watched him struggle with it for about 10 minutes. In those 10 minutes, three NCOs walked right by the Soldier and ignored him. So I went over to the PFC and asked him what the problem was, and he said he couldn't get through the function check. I climbed up on the HMMWV, looked at it, and found that the timing was off. He said he didn't know anything about the timing and asked if I could fix it for him. I yelled out for his team leader, got him behind the machine gun, and told him to fix the timing. He fumbled around a few minutes before giving up. I went through the squad leader, platoon sergeant, and first sergeant and couldn't find anyone that knew how to adjust the timing. So I excused the Soldier and we NCOs had a little class on setting the head space and timing on a .50 caliber machine gun.

I think our senior NCOs have lost their basic combat skills. And we expect them to also be proficient at small-unit tactics and MOS proficiency? Some NCOs have said that we spend too much time training tactics and not enough time on MOS proficiency. We should remember that a lot of stuff happens between the FOB and the Objective. It's the world we live and fight in, and all that technical proficiency doesn't do anyone any good if you can't even make your way to the dance.

A holistic approach to training in garrison and in combat is possible, even with the predeployment timelines we have today. The Schoolhouse has a limited amount of time with Soldiers and can't train them on everything. I see the year after OSUT, BNCOC, and ANCOC as the critical times in an NCO's development. The field has to pick up the ball and carry the NCO's technical and tactical education to an acceptable level of competency. Lives depend on it.

Hopefully this article will spark some interest, or controversy, from the field and produce articles we can share throughout the Regiment. I don't pretend to have all the answers. But I know we can find the solution if the Regiment as a whole lays hold and heaves.

BUILDING STRONG STARTS WITH GETTING THE RIGHT PEOPLE

By Lieutenant General Robert L. Van Antwerp

We are in historic (many would say "hysteric") times. The challenges are legion with military and civilian deployments, an aging infrastructure, and an unprecedented workload. The United States Army Corps of Engineers is making a difference now and positioning for the future.

That positioning requires that we grow by recruiting the right military and civilian professionals needed to deliver superior performance. It means building our organization "strong" so that it is built to last. We're doing it by hiring passionate and talented people who care about the role they play in providing the infrastructure our nation needs to strengthen our economy and keep our country, armed forces, and their Families safe and secure.

The right people make a difference, and they—more than our programs—will determine our organization's ability to succeed now and in the future. Our talented men and women plan, orchestrate, and execute our multifaceted array of engineering operations, ranging from combat engineering to general and geospatial engineering, to massive reconstruction of entire nations, such as Iraq and Afghanistan.

However, it's one thing to say that we need great people; it's another thing to critically examine what people we need and what makes them relevant to our mission. In Jim Collins' book *Good to Great*,[1] he talks about the importance of having the right people in the right seat on the bus. The individuals who work in our Regiment should demonstrate great character and values. They should be fit, tough, smart, innovative, and adaptive. They must be energetic, passionate, and truly committed to the mission. We need to be smart in how we recruit for our Regiment, which means going after the right people who want to work for us for the right reasons.

Collins also talks about being experts in our field. That starts with getting certified—your Professional Engineer (PE) license if you are an engineer, your Project Management Professional (PMP) certification if you are a project manager, your real estate license if you are a real estate professional, etc.

We are recognized around the world for our engineering expertise, construction management, and skills in many other disciplines. Our workforce possesses extraordinary experience and expertise in every one of our diverse functional areas.

But one day, our most experienced engineering professionals will leave us, and we need to build our bench now. The most effective way to grow tomorrow's experts is by giving them hands-on experience today. We are in the midst of an estimated $44 billion in military construction and Army Base Realignment and Closure (BRAC) Commission projects between now and fiscal year 2013, which translates to more than $44 billion worth of living classrooms to train new, talented, and passionate engineers. At Fort Bliss, Texas, we are completing one building a week for the next five years. In Iraq, we have $3.6 billion worth of military construction projects.

By designing and building billion dollar facilities that help improve a Soldier's quality of life and battlefield preparedness, to improving dams, levees, and other flood risk management projects, our young engineers, biologists, chemists, physicists, and architects will experience unique training opportunities that no other organization can begin to offer.

The future is bright for the Corps. There is a growing requirement to approach engineering challenges in a sustainable manner, with alternative approaches to design, construction, materials, energy development and use, water resources management, land use, and watershed planning. Engineers need the ability to work across boundaries and communicate with their diverse base of customers. They must have effective leadership skills to guide multidisciplinary and multinational teams of volunteers, contractors, and state and local officials.

These are new and exciting times, and the Corps of Engineers is blessed with a unique opportunity to lead the way and make a real difference in the lives of every American.

Building Strong!

Lieutenant General Van Antwerp is the 52d Chief of Engineers and Commander of the United States Army Corps of Engineers. Previous assignments include Commanding General, United States Army Accessions Command and Deputy Commanding General for Initial Military Training at Fort Monroe, Virginia; Commanding General, United States Army Maneuver Support Center and Fort Leonard Wood, Missouri, and Commandant, United States Army Engineer School; United States Army Corps of Engineers Los Angeles District; the United States Army Division, South Atlantic, Atlanta, Georgia; and the 326th Engineer Battalion, 101st Airborne Division (Air Assault), during Operations Desert Shield and Desert Storm.

Endnote

[1] *Good to Great* by Jim C. Collins, Harper Business: New York, 2001.

Early Engagement Strategy at Norwich University

By Lieutenant Colonel Richard A. Pratt and Brigadier General (P) Gregg F. Martin

> Field Manual 3-0, *Operations,* states that the Army's operational concept is full spectrum operations:
>
> *Army forces combine offensive, defensive, and stability or civil support operations simultaneously as part of an interdependent joint force to seize, retain, and exploit the initiative, accepting prudent risk to create opportunities to achieve decisive results. They employ synchronized action—lethal and nonlethal—proportional to the mission and informed by a thorough understanding of all variables of the operational environment. Mission command that conveys intent and an appreciation of all aspects of the situation guides the adaptive use of Army forces.*

The role of the engineer force is critical in all four elements of operations—offense, defense, stability, and civil support. Our current operations challenge our deployed engineer units daily with a myriad of missions across the full spectrum of operations. The need for an Engineer Corps capable of meeting these challenges and providing America's Army the engineering expertise required to defeat our enemies and build infrastructure has never been more apparent. Further, the need for young officers—capable of demonstrating the Sapper Spirit in high-intensity conflict balanced with the technical know-how required during stability and civil support operations—has never been more significant to our Regiment.

Lieutenant General Robert L. Van Antwerp, the United States Army Chief of Engineers, is investigating a theory that indicates our engineer leader technical competency has declined over the past several years. Some examples include—

- United States Army Corps of Engineers (USACE) performance prior to, and response during, the aftermath of Hurricane Katrina.
- Comments from senior military engineer leaders regarding engineer support to the War on Terrorism.
- Increased emphasis placed on construction engineering skills highlighted by a presidential directive placing stability operations on par with offensive and defensive military operations.
- Current engineer force structure that does not facilitate senior engineer mentoring of junior engineer officers.
- Known decreases in military engineering developmental assignments and a shift toward sapper (mobility and countermobility) focus in the Engineer Regiment.

Each of these contributory factors indicates that there is a possible technical competency decline that potentially crosses multiple levels of both civilian and military leadership.

The Chief of Engineers asked Brigadier General Martin, then Commandant of the United States Army Engineer School, to lead an investigation and resolution of the decline. The Commandant formed a coalition from within and outside the Department of Defense to investigate and implement solutions that reverse engineer leader technical competency decline. The intent is to develop and implement an integrated, sustainable National Engineer Leader Technical Competency Strategy that accesses, develops, employs, and retains world-class engineer leaders who are technically and tactically capable and competent to deliver full spectrum engineering in the 21st century.

LTG Van Antwerp also charged the Regiment's senior leaders to focus their strategic communications towards the concept of *Building Great Engineers*. BG Martin did some quick analysis to determine where he'd be able to make the "biggest bang for his buck." He concluded that he would engage several military colleges at the strategic level—the university president, the Dean of Academics, and the Commandant of Cadets. Further, he'd engage at the operational level—with department heads and instructors—and also at the tactical level, where he would emphasize the need for engineering students to answer the Nation's call, putting their newly acquired engineering skills to work across the full spectrum of operations in support of the Army and the Nation.

BG Martin and I visited Norwich University, a private school that houses approximately 1,900 cadets, traditional students, and commuters from more than 40 states and 20 foreign countries. The university combines nearly two centuries of military tradition and a broad range of traditional undergraduate degree programs in the rugged Green Mountains of Northfield, Vermont. Founded in 1819 by Captain Alden Partridge, it is the first private military college in the United States and is the birthplace of the nation's Reserve Officers' Training Corps (ROTC) program. The David Crawford School of Engineering (DCSE) at Norwich University is the oldest private engineering school in the nation, with undergraduate programs that include civil, environmental, computer, electrical, and

BG Martin and LTC Pratt emphasize the importance for engineering students to put their newly acquired skills to work in support of the Army and the Nation.

mechanical engineering, and Norwich also offers a master of civil engineering degree.

Norwich graduates and commissions officers through Army, Marine Corps, Navy, and Air Force officer training. Participation in ROTC, including military labs and physical training, is mandatory for all members of the Corps of Cadets and is an integral part of the Corps leadership experience.

During our visit to Norwich, we met with the staff and faculty of the university, as well as cadets (seniors) from Army, Navy, and Air Force ROTC programs. BG Martin gave them an overview of what Army engineers do and what our joint capabilities are and provided examples of where officers from different Service components can often meet on the modern battlefield—such as in assignments with the Gulf Region Division (GRD) of USACE. His personal experiences in Iraq emphasized full spectrum operations, including route clearance operations, bridging, and base camp development. He also emphasized the opportunities for cadets and students to participate in the summer hire program in USACE Districts located throughout the United States—great developmental opportunities for future officers in the Regiment.

The results of the trip indicated that there is a need for the Engineer Regiment to develop a working relationship with the Norwich University Engineering Department. This will facilitate access and information flow to current engineering students, both civilian and military, with the intent to encourage future civil service as military officers or Department of the Army civilians in USACE Districts. The trip also indicated the need for the Engineer Regiment to play an integral role during the ROTC summer training called "Warrior Forge" at Fort Lewis, Washington, where ROTC cadets get a snapshot of each of the branches prior to completing the accession packet and branch requests in the early fall. The Norwich University Professor of Military Science emphasized an early engagement strategy to ensure that the future officers were making informed selections.

A second trip was recently conducted that was designed to engage more at the operational level. The New England District Commander represented the USACE presence in the New England area—home to many Norwich cadets. We met with the Commandant of Cadets, the Dean of the Crawford Engineer School, and several Engineer School professors to further exchange ideas and develop the emerging partnership. We also conducted tactical engagements with cadets to emphasize common opportunities afforded to engineer officers including—

- Assignment opportunities ranging from tactical units assigned to brigade combat teams to USACE Districts.
- Graduate school opportunities.
- The potential to attain professional engineer certification with Army experience.
- Attendance at Sapper School.

Future meetings aim to further integrate the faculty members and students at Norwich University with the Army Corps of Engineers, including the orientation of some Norwich faculty members at the Engineer School at Fort Leonard Wood and invitations to attend the annual ENFORCE Conference.

With our need to develop the technical competency required to execute the full spectrum of operations, we must reach out to the commissioning sources and future officers to recruit the capabilities we need. What we discovered is that both the Corps of Engineers and Norwich University can benefit from an increased dialogue, and we must encourage similar relationships to develop with other academic institutions. The process starts with successful Army officers reaching back to their alma maters and opening a dialogue with the college or university administration. The process of *Building Great Engineers* for America's Army starts with us.

Lieutenant Colonel Pratt is the Commander, 31st Engineer Battalion, at Fort Leonard Wood, Missouri, and a 1990 graduate from Norwich University. He holds a bachelor's in engineering technology and a master's in education. He is a licensed professional engineer in the Commonwealth of Virginia.

Brigadier General (P) Martin is Commanding General of the United States Army Maneuver Support Center and Fort Leonard Wood. Previous assignments include Commandant, United States Army Engineer School and Regiment; Commanding General, United States Army Corps of Engineers Northern Division; and Commander, 130th Engineer Brigade, during full spectrum operations in Europe, Kuwait, and Iraq from 2002 – 2004. He holds a bachelor's from West Point, as well as a master's and a doctorate from the Massachusetts Institute of Technology.

Strengthening the Regiment:

Mentorship, Leader Development, and the Engineer Community

By Lieutenant Colonel Diana M. Holland

Developing good leaders for the future is one of the most important and professionally satisfying goals that senior officers can hope to achieve. The future of the United States Army depends on the success of that goal, and our junior officers deserve the investment of time and resources to help them reach their potential. Professional development and mentorship have become increasingly important topics of discussion in the Army over the past decade. At the same time, our junior officers face a growing number of challenges to their sense of professional commitment. The challenges have emerged Armywide but, in some respects, engineer officers are at a greater disadvantage than those in other branches. The changing force structure has decreased the size of engineer communities on many installations, and the high operational tempo has prevented smaller engineer communities from developing camaraderie and cohesiveness. Therefore, engineer leaders must find creative ways to mentor, coach, counsel, or train junior leaders, not only for the officers' individual development but also for the larger goal of strengthening the engineer community.

A Generational Divide

The Army is operating and transforming so quickly that it is difficult to predict how it will be organized ten years from now. Personnel management and career progression have become unpredictable, yet these areas will have significant long-term ramifications for the future force. To those commissioned in the 1980s and early 1990s, the career landscape facing junior officers today is unfamiliar. It may seem as though there is a generational divide.

Both generations of officers have deployed to Afghanistan and Iraq multiple times, but the deployment rigor can have greater impact on a young officer than it does on one who is more senior. The older generation was more invested in, and acclimated to, the military profession by 11 September 2001. Those officers had served ten to fifteen years by the time the War on Terrorism began, and if the strain became too much, they would be able to retire in the near future. They may already have enjoyed assignments away from the tactical Army, such as in the Advanced Civil Schooling programs and in utilization assignments in the United States Army Training and Doctrine Command or the civilian world. Families were already accustomed to the military lifestyle. These observations cannot be applied universally and are not intended to trivialize the impact of multiple deployments on older and more established military Families. However, they should be considered as we engage our younger officers.

Challenges for Junior Officers

Many junior officers had a second War on Terrorism deployment when they had just three to five years in Service. They excel at preparing to deploy and at being deployed because that is all they know. They believe it is all they will do if they stay in the Army. For officers with Families, the challenge is probably greater. Single officers may wonder if it is possible to start a Family with so little time at home station. Under these circumstances, even the most dedicated officers might question their commitment to an Army career.

The Army has long practiced the two-levels-down approach to engaging and developing junior officers. Brigade commanders receive readiness briefings from company commanders. Battalion commanders target platoon leaders for professional development. The critical component of the officer efficiency report is the senior rater block. Yet the emerging engineer force structure increasingly is not well-served by such practices. As already mentioned, few engineer battalions will be colocated with an engineer brigade. Thus, on an installation that does not have an engineer brigade, the only engineer-pure, two-levels-down relationship will be between a battalion commander and the lieutenants. Under the two-levels-down paradigm, an engineer company commander will not be the focus of professional development by a leader of his or her branch. The same is true for a lieutenant in a sapper company organic to the modular brigade combat team (BCT).

In addition to those challenges shared by junior officers across the Army, engineers are at a greater disadvantage—we have lost much of our community. The current generation of battalion and brigade commanders remember when two or three levels of engineer headquarters were located at one installation. Almost all engineer lieutenants had an engineer company commander and most had an engineer battalion commander. Many served close to their engineer brigade commanders. That force structure was conducive to fostering a community to which engineers belonged. Of course, subordinate engineer elements were often task-organized under, formed habitual relationships with, and benefited from combined arms experiences with maneuver units. But, ultimately, they still belonged to an engineer chain of command that fostered interaction between senior and junior officers of our branch. Unfortunately, the interim and end-state force structures have reduced those opportunities.

Many of today's lieutenants and junior captains do not have an extensive and enduring engineer chain of command. If they are serving in a modular BCT, they have an engineer company commander and, in some cases, infantry or armor battalion and brigade commanders. In other cases, they are assigned to a BCT special troops battalion where they may have an engineer, military police, or military intelligence commander. None of those young officers have an engineer brigade commander. If junior engineers are assigned to one of the few installations with an engineer brigade, they may become part of an engineer family while not deployed. However, the engineer battalions and companies deploy so frequently that the officers face a constantly changing task organization and probably will not have time to develop a tight community.

The training and readiness authority (TRA) policy is a move in the right direction and has the potential to benefit the separate combat effects and construction effects battalions. These units will enjoy relationships with engineer brigades because of the latter's training, personnel, and materiel

Photo by Captain Charles Scheibe

Soldiers discuss road repair lessons learned during Operation Iraqi Freedom.

responsibilities. However, many battalions are not assigned to the same installations as their TRA brigade, and because of the distances between these headquarters, it will be difficult to maintain relationships. The geographically separated battalions will naturally develop stronger associations with the units on their own posts, and TRA brigades may be tempted to take a "hands off" approach to ease logistical and time restraints for all parties.

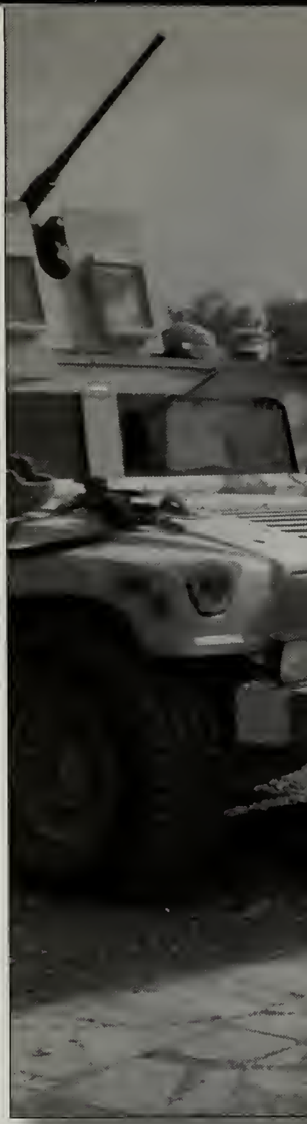
The point of this discussion is not to criticize the ongoing transformation of the branch. In fact, modularity has brought many benefits to the Engineer Regiment. Leaders and Soldiers have experienced worthwhile training and combat opportunities by serving closely with maneuver units. By forming sapper companies organic to a BCT, these engineers have a clear command and control (C2) relationship and are fully integrated into a combined arms team. Engineer leaders serving under infantry and armor commanders are exposed to a variety of professionally rewarding experiences. Likewise, because of the evolving C2 and support relationships in Iraq and Afghanistan, combat effects and construction effects battalions are also executing nontraditional missions that broaden their capabilities. Nonetheless, it is important that future senior engineer commanders consider how the changing force structure affects junior officers in the Regiment and develop a plan to mitigate its potential negative effects.

Recommendations

Engineer leaders should expand professional development opportunities beyond conventional boundaries and mentor, develop, and coach as many subordinate officers as possible. In engineer battalions, the commanders must assume greater responsibility for developing company commanders, in addition to their traditional focus on lieutenants. Company commanders will also have to develop platoon leaders. While a company commander is seldom more than a couple of years older than his or her lieutenants, that commander will have to demonstrate the maturity necessary to guide other company grade officers.

The responsibility for developing junior engineer officers should not be limited to the chain of command. Division engineers, brigade engineers, and other engineer staff officers should seek opportunities to interact with engineer lieutenants and captains. A division engineer can invite sappers from the BCTs to conferences that address engineer issues. Brigade engineers can interact with junior engineer officers in the BCT. Essentially, we have to find ways to be counselors, coaches, and mentors to young engineers, no matter what our position.

Leaders of TRA brigades must also take an active role in professional development. Though difficult to sustain, it is important that the engineer brigade and battalion commanders foster relationships between the officers at both levels. If the TRA brigade deploys, the brigade and rear detachment commanders must find ways to monitor and guide their battalions. One good idea circulating in the Regiment recommends that a recently retired engineer colonel be brought back to active duty and assigned as a brigade rear detachment commander. Such a move would maintain senior engineer leadership for engineer battalions that are not deployed.



Leaders of the United States Army Corps of Engineers (USACE) districts and divisions can also assist in building regional engineer communities. USACE organizations have more stability than operational Army engineer units and bring a wealth of technical expertise to the force. In many cases, relationships already exist. It is common for a deployed battalion to reach back to USACE for advice and support. When not deployed, these relationships should be strengthened. Few company grade officers know much about USACE. Exposing them to the Corps's unique missions and capabilities might inspire junior officers to seek further career opportunities beyond the operational Army. Furthermore, senior officers in the districts and divisions can serve as sources of engineer experience outside the formal chain of command. Thus, USACE and tactical engineer unit leaders should work to increase interaction to benefit junior officers.

Assessing progress is an important step in any training event, and it is just as important when measuring the effectiveness of developing engineer leaders and building cohesive engineer teams. The Army has formalized processes for measuring personnel, training, medical, and logistical readiness, but it has established only marginal guidelines for assessing our effectiveness at growing engineer leaders and teams. How do we know if we are making a difference? How do we improve if we are not meeting our goal? These are difficult questions, and the answers partly depend on the situation. Consistently high-performing units might indicate success, but the relationship of cause and effect may not be conclusive. In any case, the starting point is communication and engagement. Gather engineers together and ask them what they think.

Field Manual 6-22, *Army Leadership*, offers guidance on how to assess organizational climate and developmental needs; it also identifies the characteristics of a close team.[1] This guidance can be adapted to evaluating success in building a cohesive engineer community. For example, an engineer leader might ask, "What were your expectations of the Regiment, and is it

Photo by Captain Jonathan Gill

A company commander coaches a subordinate officer as their unit prepares for a major road repair mission in Iraq.

living up to those expectations?" Other questions might include, "Do you believe that at the conclusion of the current transformation initiative, there will be more opportunities for career progression than there are now?" or "Have you had the opportunity to discuss career progression with a senior engineer officer?" From this or a similar line of questioning, a leader will be able to gauge attitudes toward the branch and develop a plan to sustain or improve perceptions. Such an effort will strengthen the bonds not only between individuals but eventually within the larger engineer community.

Conclusion

The Army ensures that leaders train their units, maintain their equipment, and deploy their organizations to a combat zone, and it measures the progress of those tasks. However, it does not formally or aggressively enforce leader development and team building. Taking the time to focus on those two areas requires extra effort at a time when most leaders are overstretched and the evolving force structure compounds this challenge for engineers. Nonetheless, it is imperative that engineer leaders find ways to interact with as many officers as possible and strengthen engineer bonds. If successful, the Regiment will be a better community and continue to attract and retain high-caliber officers.

Lieutenant Colonel Holland is the Commander, 92d Engineer Battalion, Fort Stewart, Georgia. Previous assignments include plans officer, Operations Directorate, United States Central Command; operations officer, 92d Engineer Battalion; plans officer, 3d Infantry Division; and assistant professor, United States Military Academy (USMA). She holds a bachelor's from the USMA, a master's from Duke University, and a master's in military arts and sciences from the School of Advanced Military Studies.

The author would like to thank Colonel Dan Grey for his example of engineer mentorship and acknowledge his helpful suggestions in the final stages of this article.

Endnote

[1] Field Manual 6-22, *Army Leadership*, October 2006.

USACE Uses New Techniques to Attract Graduates

By Mr. Scott Nielsen

The United States Army Corps of Engineers (USACE) is trying new techniques such as "speed-networking," on-the-spot tentative job offers, and Facebook to attract recent college engineering graduates. They are trying to reach these graduates in new ways, to introduce them to the exciting and fulfilling work they could have with the Corps of Engineers. The South Pacific Division commander thinks that if students know about the Corps, many will choose to work with them.

A new technique that the Division tried is called speed-networking, which operates on the premise of the speed-dating model and allows multiple recruiters and students to meet for 10 minutes, introduce themselves and their organizations, and talk about what each is looking for. When the time is up, the recruiters switch and move to another table of students.

This speed-networking was part of a three-day conference in Burlingame, California—hosted by the American Society of Civil Engineer's Construction Institute and sponsored by USACE and other agencies—to meet and discuss several aspects of civil engineering, including career opportunities. These events helped to better understand what graduates are looking for so the agencies can try to tailor what they can offer the graduates.

This technique gave the students a chance to ask questions that they might not have asked otherwise, because they felt intimidated walking up to a booth and asking. This speed-networking format allowed the students to speak with representatives from each organization. Their questions ranged from the projects being worked on to vacation time, but the most common questions had to do with where they would be working, would they be able to do different things, and would they be in charge of their own projects.

A recruiter for the Corps of Engineers said that when we think we know what the students are interested in, we often are surprised. He said that typically students are interested both in traveling and the ability to work on multiple projects.

The South Pacific Division is also testing the social networking site called Facebook as part of its recruiting efforts. Facebook allows the students to upload their photos from the conference and share them with their friends who were not there. The Division hopes that other friends will learn about USACE and job opportunities from those who attended the conference. The Division plans to use this tool to provide information about jobs and opportunities in a way that is more accessible to current students.

At the American Indian Science and Engineering Society (AISES) National Conference in Anaheim, California, this year, the Corps provided pictures and videos of the event on a Facebook site dedicated to AISES, which the students could use to share their own photos and comments. The Corps hopes that this process will allow them to find a new way to let graduates know about the jobs that are available and also allow them to get feedback about what graduates are looking for.

> ***"speed-networking...allows multiple recruiters and students to meet"***

The Corps of Engineers is also testing on-the-spot tentative job offers at recruiting fairs to better fill the positions it needs and to attract the graduates who are ready to work and students interested in internships. The Corps knows what jobs it needs to fill and there are students who are ready to begin working now, so this is an effort to streamline the process of filling those positions.

USACE has a three-tier approach to recruiting at career fairs:

- Junior professionals meet with the graduates.
- Senior employees answer questions and interview.
- Someone with hiring authority coordinates getting the graduates started.

There is a lot of competition for fresh new talent graduating now, and the Corps hopes that using innovative techniques will allow them to reach the students in a way that is better suited to them. Even if the students do not sign on with USACE immediately after college, they—and perhaps their network of friends—have been exposed to the Corps's mission and what it can offer and may decide to apply for jobs there in the future.

Mr. Nielsen is a Public Affairs Specialist with the United States Army Corps of Engineers, South Pacific Division, San Francisco, California.

Engineers Excel at 2008 Branch Orientation Days

By Captain William E. Mohr

Reserve Officer Training Corps Branch Orientation

Fort Lewis, Washington, was once again the home of the annual Reserve Officer Training Corps (ROTC) branch orientation, but this year the engineers did something drastically different. More than one-third of engineer officers are commissioned through ROTC, but previous engineer marketing efforts were not commensurate with the importance of this summer activity. The Engineer Leader Technical Competency Study revealed that engineer officer accessions have been declining—not in numbers, but in technical proficiency. To counter this erosion of skills, the *Building Great Engineers* campaign plan identified specific methods to improve branch marketing, especially during the annual Leader Development and Assessment Course commonly known as Operation Warrior Forge.

The intent of the 2008 branch orientation was not to persuade cadets to join the engineer branch but to educate cadets about the multitude of opportunities within the Engineer Regiment. Traditionally, each of the Army's 16 branches hosts an orientation site with two to four officers as representatives for their area of expertise. In the past, this group of officers was expected to educate approximately 1,500 cadet visitors during a six-hour event. This year, the engineers decided to use a "strength in numbers" technique. More than 20 commissioned officers, warrant officers, and enlisted Soldiers from dive, dog, airborne, Special Forces, geospatial, Stryker, construction, firefighting, sapper, and clearance units were invited to explain their missions and answer questions. Other active participants included representatives from the United States Army Corps of Engineers (USACE), the United States Army Reserves, and the United States Army Engineer School (USAES). With so many site participants on hand, cadets could learn about engineer diversity and technical engineering opportunities within the Engineer Regiment.

Branch orientation marketing efforts were designed around the *Building Great Engineers* theme of improving tactical and technical competency for full spectrum operations. Promoting technical engineering within the Engineer Regiment was one major area of focus. Efforts were made not to alienate cadets with nonengineering degrees, but degreed engineers were assigned top priority and actively recruited to join the Engineer Regiment. Degreed engineers were shown how they would have the opportunity to use their education and further develop technical credentials. The Northwest Division of USACE (Seattle District) did an excellent job of explaining the many technical job opportunities available throughout an engineer's career.

Cadet feedback was very positive about the engineer branch orientation site. During the event, many cadets thanked the engineers for providing insight and answering questions to help in their upcoming branch selection decision. Communication did not end with the finale of the branch orientation. Follow-up e-mails with information about additional educational opportunities and some of the future goals of the Engineer Regiment were sent to cadets who had visited the engineer site.

West Point Branch Orientation

During the third week in September, representatives from the Army's 16 branches traveled to the United States Military Academy (USMA) at West Point, New York, to educate cadets about opportunities in their branches. Similar to ROTC cadets, West Point cadets earn their branch of service depending on their class rank. Years of studying, training, leading, and developing enable cadets to select, or in some cases be selected, for their branch. During the first week in October, cadets are required to prioritize every branch based on their personnel preference, but it is not until November that the cadets are officially notified about their new branch. USMA spends substantial resources giving cadets the opportunity to learn about the Army's different branches. Even with a complete understanding, many cadets remain undecided until the final day of branch selection. To assist cadets one final time before branch selection, the Department of Military Instruction coordinates the Junior Leader Panel and Combined Arms Tailgate Party, which focuses on resolving any remaining doubts. These final branch orientation events are designed to allow cadets to interact with personnel from the different branches in both formal and relaxed settings.

Throughout the week, the Engineer Regiment continued the marketing theme that was developed during Operation Warrior Forge—Full Spectrum Engineering. Regimental diversity was represented by engineers from more than a dozen different units, to include dive, dog, Special Forces, geospatial, construction, sapper, and USACE. Learning from Operation Warrior Forge, the greatest success during these cadet events came from small-group discussions. Simply having enough energetic engineers available for questions and

"West Point's engineer representation remains strong. The engineer branch representative is responsible for educating, training, and inspiring cadets to join the Engineer Regiment."

comments was extremely beneficial to those cadets who were still indecisive about their branch of choice.

Opening the annual West Point branch orientation events, the Junior Leader Panel is a formal question-and-answer session linking junior officers with interested cadets. Initially, the engineer panel was attended by more than 100 of the 1,000 graduating seniors. Strong initial responses revealed the historical relationship between the Engineer Regiment and West Point. Traditionally, the engineer branch is one of the top cadet selections, and a preliminary 2008 poll listed engineers as the second most desired branch. During the engineer segment of the junior leader panel, cadets divided into small groups and interacted with engineer representatives whose experiences they wished to emulate.

The Combined Arms Tailgate Party, which followed the Army football game, created a relaxed environment where cadets were given the opportunity to experience branch culture. Open to the public, the event featured food, beverages, and entertainment. Hoping to show something different and continuing with the full spectrum engineering theme, Engineer Regiment personnel conducted mine dog demonstrations throughout the party. The engineer booth also displayed the wide array of platoon leader opportunities and assignments. During the evening, cadets roamed among the different branch booths evaluating the strengths and weaknesses of each.

West Point's engineer representation remains strong. The engineer branch representative is responsible for educating, training, and inspiring cadets to join the Engineer Regiment. Her dedicated work throughout the summer and during these two events continues to increase cadet interest in the branch. The civil and mechanical engineering department also strongly markets the Engineer Regiment through coordinated luncheons, guest speakers, tailgate parties, and other social activities. Engineer support at West Point continues to educate cadets about all the opportunities within the Engineer Regiment.

Thank You

Thanks to all who participated during this summer's branch orientation events. These events would not have been successful without the positive energy and hard work of the participants. Your dedication to the future is greatly appreciated. For those who did not get the opportunity to assist with these great events, mark the calendar for the 2009 branch orientations. USAES will be actively seeking participants who are interested in representing the branch next year. Essayons!

Captain Mohr is the Building Great Engineers *action officer. He previously served as the 864th Engineer Battalion construction officer and deployed with Alpha Company, 391st Engineer Battalion, of the Army Reserves to Afghanistan in support of Operation Enduring Freedom.*

("Clear the Way," continued from page 2)

On the brilliant morning of 9 October, the TRADOC CG, GEN Wallace, passed the MANSCEN/FLW Colors from MG Bill McCoy to me. We thank and honor MG and Jill McCoy for their great leadership, friendship, and many significant achievements over the past two years. We will miss them here at FLW and wish them Godspeed as they move to their new assignment as Deputy Inspector General of the Army.

I look forward to serving with and supporting each of you and the Engineer Regiment in my new role as CG MANSCEN and FLW.

Before closing, I want to re-emphasize that as Army engineers, we are all Sappers! Regardless of your MOS, component, status, or duties—our Army and Regiment need you to adapt, innovate, and overcome, in order to get to the objective and accomplish the mission, whatever it is...And to me, that's what being a Sapper is all about: a state of mind that figures out how to get the job done—no matter what—and has the willpower, perseverance, and strength (mind, body, and spirit) to see the mission through to completion ...all the while taking great care of our People. We are all Sappers—Hooah!!!

I want to thank each of you for who you are and for what you do—I am enormously proud of you! Every one of you is a critical member of our great Team. What each of you—and we collectively—do is extremely important and really matters to our Army, Joint Force, and Nation. You all are doing a terrific job in an extremely complex, difficult, and resource-constrained environment. I encourage you to keep at it and to stay on the team!!! Many THANKS to you and your Families, and may God bless each of you!!!

Signing off the net as your Regimental Sapper-6...

Essayons!!! Army Strong!!

SAME Construction and Engineering Camps:

Building Great Engineers by Mentoring Students

By Mr. Ron Brown

In the summer of 2000, the Society of American Military Engineers (SAME) embarked on a venture that would prove to be one of its most successful tools to expose talented high school students to the excitement of engineering and construction. Several SAME members, together with officials from the United States Air Force Academy (USAFA) in Colorado Springs, Colorado, designed a one-week curriculum focused on general engineering and construction, set in a student-mentor camp environment. The camp provided specially selected students from grades 10 through 12 with a hands-on orientation to engineering as a career.

In this specially selected and environmentally beautiful setting at USAFA, students came together with new graduate engineers and seasoned engineering and construction veterans of SAME to share engineering concepts and discuss the attributes associated with an engineering career. The students were guided in their daily activities by USAFA cadets majoring in engineering and were exposed to topics such as—

- Concrete beam design.
- Materials testing.
- Paradox anomalies.
- Storage shed design and construction.
- Leadership training.

Their mentors provided guidance and counseling by answering the never-ending questions from these talented students.

The success of the first SAME-USAFA Engineering and Construction Camp provided the initial roadmap for the development of a camp cosponsored by the United States Navy at Naval Base Ventura County at Port Hueneme, California, and another cosponsored by the United States Army Engineering Research and Development Center at Vicksburg, Mississippi. The Engineering and Construction Camps bring each student closer to an understanding of what engineering careers offer and allow them to experience the camps' activities and events with student peers from the United States and around the world.

As a result of these camps, many of the student alumni have been nominated for and appointed to attend each of the military service academies. Camp alumni have now graduated from the academies and are pursuing military engineering careers. Through the excitement generated by the camps, many of the students have decided to pursue a broad range of engineering careers and are attending some of the nation's most prestigious universities and engineering colleges approved by ABET, Inc., formerly known as the Accreditation Board for Engineering and Technology.

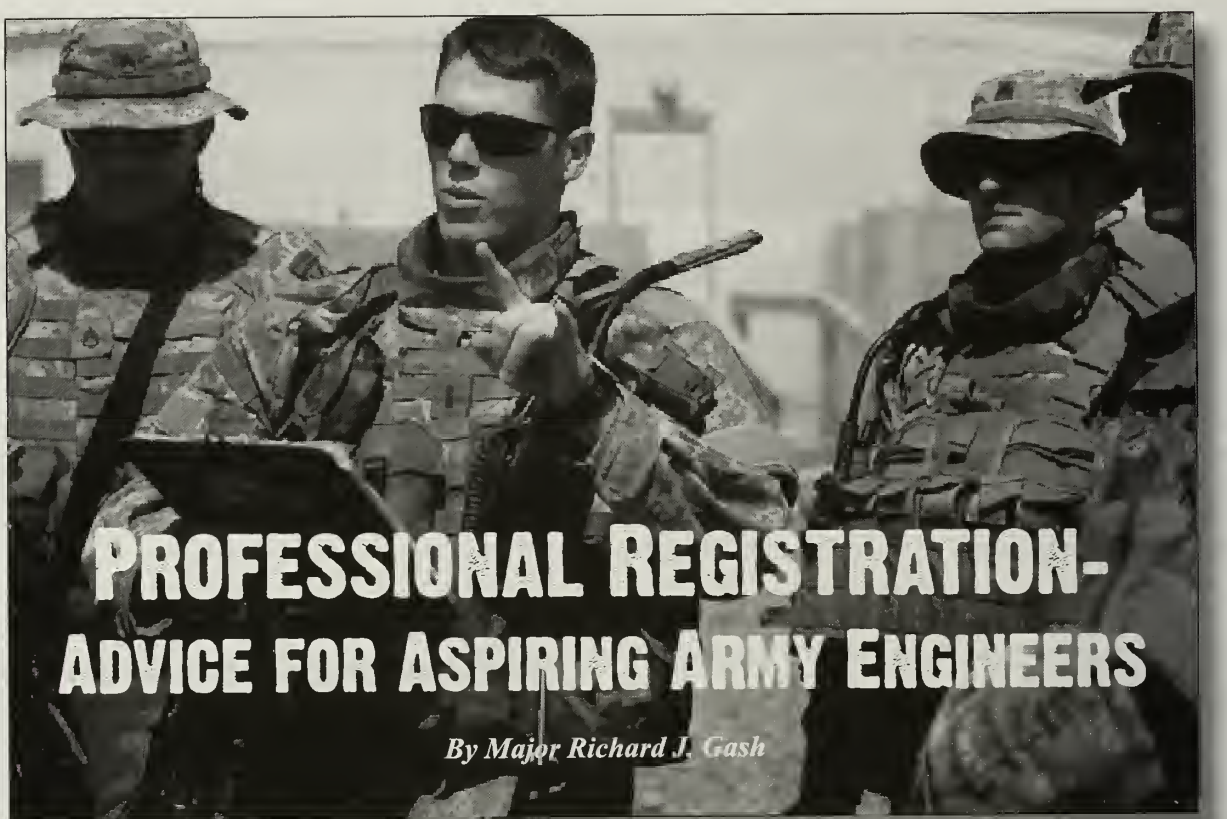
> ***"Students came together with new graduate engineers and seasoned engineering and construction veterans of SAME to share engineering concepts."***

In 2009, SAME, in concert with cosponsors from the military Services and SAME posts worldwide, will celebrate its tenth consecutive year of conducting these camps and providing a valued service to our nation and the engineering profession. SAME is truly a force multiplier in waging the "War on Talent" to ensure that students and families get the opportunity to understand and seek valued engineering careers.

Be a part of this tremendous movement and share the experience of being a valued mentor at one of the SAME Construction and Engineering Camps next summer. Make a difference by helping with *Building Great Engineers*. For more information about the SAME Engineering and Construction Camps, visit <*http://www.posts.same.org/camps*>. To sign up as a mentor for one of the camps, visit <*http://posts.same.org/camps/2008/mentors.htm*>.

Mr. Brown is a retired Army colonel and a senior executive with Sundt Construction, Inc. He is a member of the SAME national board of directors and the national chair for the SAME Engineering and Construction Camps. He also serves as the national chair of the Government Affairs Committee for the Associated General Contractors of America.

Society of
SAME
American Military Engineers



PROFESSIONAL REGISTRATION-
ADVICE FOR ASPIRING ARMY ENGINEERS

By Major Richard J. Gash

Author's Note: I originally wrote this article in 2002, after my peers and I had struggled through the process of preparing to take the National Council of Examiners for Engineers and Surveyor's Practices and Principles of Engineering Examination.[1] Its goal was to provide a roadmap to success for Army engineer officers seeking licensure as professional engineers. I offer both that the advice that follows is still valid and that the need for licensed engineers in our Regiment has never been greater. Current events in Iraq and Afghanistan demonstrate how today's operational environment demands great engineers. Professional registration is one way we can help ensure that we will have them in our ranks.

Several years ago, a group of Engineer Captain's Career Course (ECCC) classmates and I struggled through the professional engineer (PE) application process. After hours of toiling over experience forms, making innumerable telephone calls to the Missouri Board for Professional Engineers, and spending a small fortune on express mail, some of us met the application deadline. Many did not.

The purpose of this article is to capture the lessons we learned while applying and share them with engineer officers aspiring to do the same. In keeping with the finest of military operations, I have broken the process into four phases. The first phase involves becoming an engineer-in-training and laying a foundation for future success. The second phase is filling out the application. The third phase, which is generally everyone's favorite, is studying and preparing for the exam. The final phase is taking (and passing!) the exam itself.

Phase I: Engineer in Training

This phase begins before commissioning and continues through the Engineer Basic Officer Leader Course (BOLC) and assignments leading up to the ECCC. The first step is to become an engineer-in-training by graduating from an engineering program approved by the Accreditation Board for Engineering and Technology and passing the Fundamentals of Engineering Examination administered by the National Council of Examiners for Engineers and Surveyors. These requirements are nonnegotiable because they are written into the state laws governing registration boards. The second step is BOLC. My advice for the course is threefold. First, pay attention. Second, keep the construction handouts. Third, start a professional journal. While it may be possible to succeed without the first two pieces of advice, the journal is essential.

Your professional journal should include a record of all the engineering-related projects you work on. The BOLC practical exercises are a great place to start. This record will make filling out the experience portion of the PE application much easier. Another important aspect of the journal is contact information. The application requires the officer who was your supervisor at the time to verify your engineering work experience. While at BOLC, get a good permanent standard or e-mail address from your platoon trainer and company commander. You will have to mail one of them part of your application for signature four years later. Your journal should also include contact information for PEs you work under. You will need recommendations from three of them for the application. If anyone in your

BOLC chain of command—from platoon trainer to brigade commander to course director—is a PE, introduce yourself, state your intentions, and get good contact information.

Phase I continues with the jobs you hold as a lieutenant. Keep updating your journal with contact information for PEs and supervisors. Continue to record engineering projects you work on. While some of us are lucky enough to work in construction units or even for the United States Army Corps of Engineers, most of us are more familiar with concertina wire and C-4 than construction. *This is not a problem.* Believe it or not, much of the work done by mechanized and light engineers *is* engineering related. Route, bridge, and ford reconnaissance; bridge classification and demolition; terrain and trafficability analysis; and even combat obstacle and fighting position construction all require engineering and project-management skills. Record them in your journal. Always fight to get projects that will add to your experience. A combat engineer platoon can easily clear and construct a live-fire range or even a playground!

Phase I culminates with the transition to ECCC and the start of the Principles and Practice of Engineering Examination application process. Fortunately for most engineer officers, the engineer-in-training experience required to apply generally coincides with the move to Fort Leonard Wood, Missouri. The end state for this phase is four years of experience and good contact information for supervisors and PEs. If your experience doesn't quite add up to four years, don't panic; ECCC and postgraduate education (quite possibly at the Missouri University of Science and Technology [Missouri S&T]) will add to your time.

Phase II: Application

The application to take the Principles and Practice of Engineering examination is probably the biggest obstacle separating Army engineers from professional registration. Timing, perceived lack of engineering experience, and the inability to obtain signatures combine to discourage many officers from applying. Selecting the proper exam date and completing the application early will give you the best chance for success.

The Missouri Board for Architects, Professional Engineers, and Professional Land Surveyors and Landscape Architects administers the examination semiannually in April and October. I recommend taking it right after graduation from ECCC. Although it is tough to juggle course requirements, studying, and trips to the Lake of the Ozarks, staying on for the Missouri University of Science and Technology degree will give you a chance to take the exam a second time in Missouri if you fail. Get an application from the Missouri Board as soon as you begin ECCC. You can request one through the board's Web site at <*http://pr.mo.gov/apelsla.asp*>. Even though applications are generally due three months before each examination, complete yours as soon as possible and turn it in early. If the board finds any problems with it, you will have time to correct it. I found the board very willing to help.

Becoming a Professional Engineer

The licensure of professional engineers (PEs) is important to the public because of the significant role engineering plays in society. The profession regulates itself by setting high standards to help protect the public safety and welfare. Becoming registered as a PE increases your opportunity for promotions, pay raises, credibility, respect, and security.

The registration process involves the following steps:

- Graduating from an Accreditation Board for Engineering and Technology accredited program.
- Passing the Fundamentals of Engineering Examination.
- Gaining a minimum of four years (three years with a master's) of verified practical engineering experience.
- Passing the Principles and Practice of Engineering Examination.

Examinations are typically administered twice a year, once in April and once in October. Applications must be completed 45 to 120 days before the examination date, depending on the individual state regulations.

The Engineer School point of contact for questions pertaining to the PE registration process is Mr. Chad Morris, PE, at <*chad.alan.morris@us.army.mil*>.

The two sections of the application that cause the most headaches are Section V, *References*, and Section VI, *Engineering Experience*. Section V requires applicants to obtain character recommendations from five individuals, three of whom must be PEs. I strongly advise sending out additional recommendation requests. Since military life is transient by nature, at least one of the officers on whom you were banking will be deployed or in the middle of a PCS, or will simply not receive your request. The recommendation form is easy to fill out. A couple of completed extras will ensure that you do not get caught short. It is also very likely that you have been out of contact with many of your potential references for some time. Your BOLC brigade commander or former college professor may not remember who you are. If you fear this may be the case, include a copy of Section VI from your application and the telephone number of your last battalion commander for them to contact.

An early start should allow you plenty of time to get the recommendations you need. However, if you find yourself closing in on the application deadline and still in need of recommendations, there is one last course of action available. Start knocking on doors at the United States Army Maneuver Support Center at Fort Leonard Wood. Because it is the home of the United States Army Engineer School, it has one of the highest concentrations of PEs in the Army. With a proper introduction and the right testimonials, you should find the recommendations you need. *(Note: The Engineer School point of contact shown in the figure maintains a list of PEs on post.)*

Section VI is the meat of the application. In it, you must account for four years of engineering experience—all accrued subsequent to baccalaureate graduation. Here is where the experience part of your professional journal will come in handy. The application requires a brief synopsis of the work you have done in each job you have held. A supervisor who oversaw your work must verify each synopsis with his or her signature. Although the application appears to imply that this supervisor must be a PE, this is not the case. Keep in mind that you cannot use the same person as a supervisor and as a reference. Remember to include BOLC and ECCC as part of your experience. *(Note: The Engineer School point of contact has examples that might be helpful.)*

If you have any questions while working on your application, the best thing to do is contact the board or the Engineer School point of contact. The end state for this phase is an accepted application and a letter back from the Missouri Board authorizing you a seat at the examination. Once you have this letter in hand, it is time to focus all your energy on studying and Phase III.

Phase III: Preparation

The question of how much effort to put into studying for the Principles and Practice of Engineering Examination is foremost on every applicant's mind. The best answer—although probably not the one you want to hear—is (of course): Enough to ensure that you pass! This can range anywhere from a few weeks to a few years. Each applicant should conduct an introspective assessment to determine how long and how hard he needs to study. I recommend erring toward longer and harder. It is important to note that for many, this period of preparation may need to start well before Phase II is completed.

The next questions most applicants have are what and how to study. Fortunately, I can offer much more explicit advice in this area. Concerning what to study, I strongly recommend that applicants purchase Michael R. Lindeburg's *Civil Engineering Reference Manual, Practice Problems for the Civil Engineering PE Examination, and Civil Engineering Sample Examination.* Used together, these three books will serve as excellent study guides. They will also function as invaluable resources during the examination. The reference manual contains detailed information about the examination, step-by-step sample problems, and a wealth of up-to-date reference material. The practice problems book includes sample problems covering engineering fundamentals and all disciplines of civil engineering. The sample examination offers a great way to gauge the progress of your preparation. All three books are well worth the cost.

How to study is a little more complicated. It is best to develop a solid plan of action that will streamline your preparation process. A good place to start is by researching the examination, which recently underwent significant revision. The new exam format has two sessions. The morning session includes 40 multiple-choice questions that encompass all disciplines of civil engineering. The afternoon session also has 40 multiple-choice questions focused on one of five disciplines. Applicants must choose from water resource, transportation, geotechnical, environmental, and structural engineering. Decide on a discipline early in your preparation, and focus your studying on that field.

After selecting an area of emphasis, the best way I found to study was to work through the practice problems in Michael Lindeburg's books. The first section in the reference manual is devoted to engineering fundamentals. Although these may seem rudimentary at first, I found them invaluable as a review of complex unit conversions and how to use my calculator. Mastering these two areas alone will greatly enhance your chances for success on the examination. The next sections are each devoted to one of the five afternoon disciplines. Don't be disheartened by the difficulty of the sample problems. With practice, answers will begin to come easily.

While you work through sample problems, take time to become familiar with your reference materials. Chances are that you have the information needed to answer all of the examination questions somewhere in your references. The trick is being able to find the right information quickly. Try to avoid always looking for answers in Michael Lindeburg's books. One slight flaw with using them as study guides is that by design, almost all the information needed to solve his sample problems can be found somewhere in his reference manual. Some of the actual exam questions may require you to dig through other references. You need to become familiar with your other manuals as well.

As examination time draws near, I recommend taking a break from studying. Take some time to relax and mentally recharge. You definitely do not want to be burned out before starting the eight-hour exam. Take the last few days to finish organizing your references and supplies and make the transition from Phase III to Phase IV. The end state for this phase is the confidence that you are ready to pass the examination.

Phase IV: Examination

Taking the Principles and Practice of Engineering Examination is the last step in the process of becoming a registered PE. This phase involves actions on the objective. I can offer advice on what to bring with you, along with some final hints. Taking the examination is up to you!

Applicants often lose sleep while trying to determine which reference books to take to the exam and which to leave behind. I can clear up any confusion. If in doubt, take it. Take every book you own that remotely relates to engineering. Go to the Maneuver Support Center library and check out any additional books you think you might need. Take a good dictionary, the thicker the better. Inevitably, questions will include obscure words you have never seen before. Take your Engineer School handouts. They present a surprising amount of pertinent information in an easy-to-follow format. Don't worry about being overloaded. No matter how many books you take, you will see people at the exam with more. It is easy to tell the first-timers from the veterans of several examinations. The novices all struggle from their cars to the exam room, dropping books out of overflowing cardboard boxes. The veterans all have bookshelves on wheels they can push along with them. I recommend the middle ground—a collapsible luggage dolly.

In addition to your reference materials, make sure you think through the logistics involved in taking the exam. You will need a good transportation plan. This is partly to accommodate your reference materials, but mostly because of the road network in central Missouri. The board makes every effort to centralize the exam location for applicants from across the state. Unfortunately, this ensures that a direct land route will not exist between the exam site and Fort Leonard Wood. Take the time to conduct a good route recon before the examination. Struggling down unfamiliar Ozark roads in the predawn darkness will only add unneeded stress to your day. A better plan would be to spend the night before the examination in a local hotel so you won't have to worry about getting to the examination site on time.

Having the proper amount of supplies is also essential to success. Determine how many pencils, erasers, batteries, and even calculators you think you will need—and double that amount. Halfway through the afternoon session is not the best time to realize that the 7 key on your calculator has stopped working.

My final piece of advice is to stay relaxed. Don't panic or get frustrated. Stick to your plan of action. Don't try to switch afternoon disciplines at the last minute just because you overheard someone during lunch saying that transportation was easier than water resources. Trust your preparation. Keep a positive attitude. The end state for this phase is walking out of the exam site with full confidence that you passed!

Major Gash is currently a student at the United States Army Command and General Staff College at Fort Leavenworth, Kansas. His previous assignments include service as an assistant professor in the Department of Civil and Mechanical Engineering at the United States Military Academy; as a company commander in the 864th Engineer Battalion at Fort Lewis, Washington; and as a mechanized engineer platoon leader and company executive officer in the 70th Engineer Battalion at Fort Riley, Kansas. He has served in combat in both Iraq and Afghanistan. Major Gash is a graduate of the United States Military Academy and holds master's degrees in geology and geophysics from the University of Missouri-Rolla (now Missouri S&T) and civil engineering from the University of California, Los Angeles. He is a registered professional engineer in the State of Missouri.

Endnote

[1] "Professional Registration: Advice for Aspiring Army Engineers" by Captain Richard J. Gash, *Engineer*, October-December 2002, pages 48-50.

Editor's Note: On 6 November 2008, the American Society of Civil Engineers (ASCE) honored Major Gash at the 138th Annual Civil Engineering Conference in Pittsburgh, Pennsylvania, with its 2008 Young Government Civil Engineer Award. The society presents the award annually to a distinguished civil engineer under the age of thirty-five who has demonstrated significant contributions to civil engineering in the public sector.

("Clear the Way," continued from page 3)

This is the second active duty MEB to stand up and, like the 1st MEB at Fort Polk, it has become part of the maneuver support family and by extension the engineer family. Additionally, the mighty 130th Engineer Brigade once again uncased its colors –this time in Hawaii, under its new commander, COL Fabian Mendoza. CSM Wells represented the school house and reported back that the uncasing ceremony was a sight to behold—it is great to have the 130th back on active duty!

On the engineer strategic front, the *Building Great Engineers* flywheel continues to turn as we focused on officer accessions this past summer and fall and are in the midst of rewriting DA PAM 600-3, which is a big part of our employment line of operation. It was a great honor for me to attend branch night at West Point on 2 November where we pinned the castle branch insignia on 136 senior cadets. Initial analysis shows that we had another good year with the statistics very similar to those in 2007, with about 58 percent having hard engineer degrees. We still have to compile the results from our ROTC accessions. In November, we held a *Building Great Engineers* Council of Colonels where our regimental leadership developed recommendations for developmental and key developmental branch positions in support of the DA PAM 600-3 update. Additionally, the colonels set the agenda for the work group sessions at ENFORCE this year.

Speaking of ENFORCE, I ask all of you to place 20-24 April 2009 on your calendar as these are the dates of ENFORCE 2009. We are working hard here at Fort Leonard Wood and with our regimental Army Engineer Association to put on the best ENFORCE ever! We will continue the theme of *Building Great Engineers* to keep the strategic campaign plan moving forward. This year's ENFORCE is going to be an awesome event as we continue to focus on the Regiment's most important resource: the Soldiers of our Regiment. In this light, the entire conference will be held at your home—Fort Leonard Wood. As previously mentioned, registration information and agendas are published on our public website. We want to see more engineers from the operational Army attend this year's event, and we have gone out of our way to structure both the content and the cost to support your coming to this great event.

It is an indeed an exciting time for the Engineer Regiment!

Building Great Engineers:

How SAME Is Your Closest Ally

By Mr. Ben Matthews

In August 2008, I had the privilege of representing the Society of American Military Engineers (SAME) on a panel at the United States Army Corps of Engineers (USACE) Senior Leader's Conference in Pittsburgh, Pennsylvania. The panel's primary focus was to outline what the USACE divisions were doing toward *Building Great Engineers* and increasing the technical competency of the Engineer Regiment. The central point of my briefing was that professional societies, especially SAME, are there to help.

The mission of the SAME College Outreach Committee is to "promote the engineering career field at colleges and universities through student chapters, mentoring programs, scholarships, and career planning seminars." The college outreach mission supports the overall SAME mission, which is to "promote and facilitate engineering support for national security by developing and enhancing relationships and competencies among uniformed services, public and private sector engineers, and related professionals."

Those mission statements show that there is a definite synergy between the goals of SAME and the campaign plan for *Building Great Engineers* set forth at ENFORCE 2008. For example, one of the action items under the accessions section of the campaign plan is to "attract engineering talent by researching top engineering schools and concentrating marketing efforts at these institutions. Additionally, strategically assign engineer officers as Professors of Military Leadership (PML) at selected engineering schools." An item in the strategic communications section of the plan advises commanders to "develop a plan where senior engineer leaders visit local universities to promote degreed engineers and their subsequent joining of the Engineer Regiment."

SAME can definitely help the Engineer Regiment with those two items. With more than 100 posts in the United States, SAME has a presence near every major military installation. When senior leaders are ready to go out to local engineering institutions, SAME post leaders are there to help with the follow-up by maintaining contact with prospective engineer officers.

Since education and mentoring are so important to the mission of SAME, the organization's dues structure makes outreach as easy as possible: SAME membership is free for students. As engineer leaders execute the *Building Great Engineers* campaign plan, we hope you will bring your SAME cohorts along. We are there to help!

For more information, visit the SAME college outreach website at <*http://www.same.org/college*> or the SAME student membership signup website at <*https://www.same.org/i4a/forms/form.cfm?id=72*>.

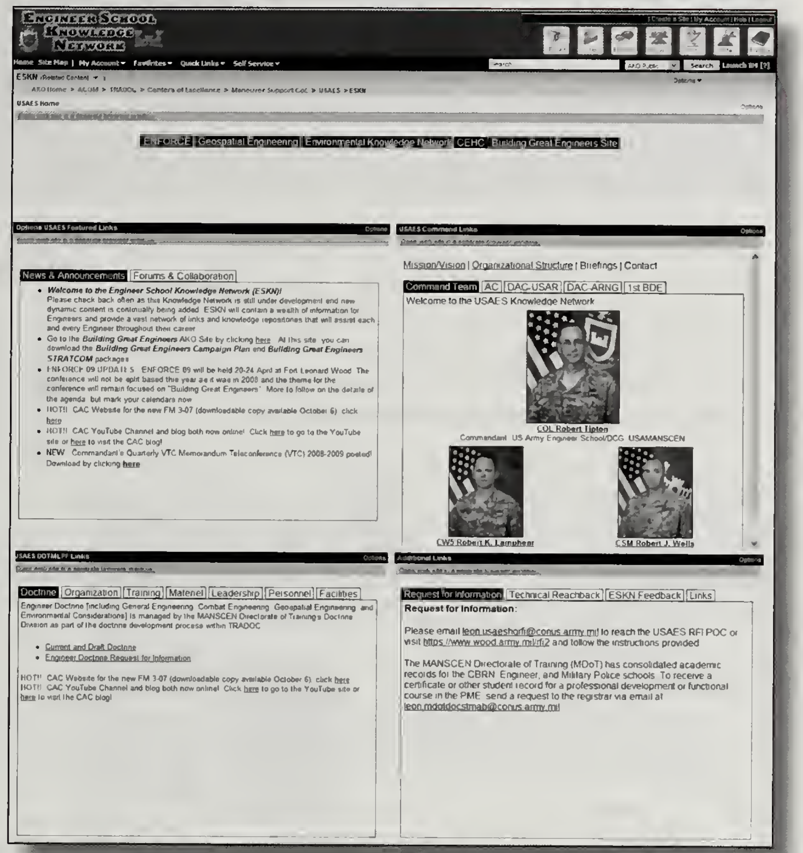
Mr. Matthews served in the United States Air Force as a civil engineer officer for eight years. He currently works for Jacobs Engineering in Dallas, Texas. He also serves as the college outreach chair of the Society of American Military Engineers. He holds a master's in construction management from the University of Texas at Austin and is a registered professional engineer.

Knowledge Management *in Action*

By Mr. Douglas D. Fowler

There are many changes underway here at the United States Army Engineer School, and knowledge management is a component of how we do business every day. To many of you, the term "knowledge management" means control, as if knowledge were something static and unchanging, but we all know that knowledge is dynamic and constantly changing.

Knowledge management means many things to many people. It can mean creating, identifying, sharing, capturing, acquiring, and leveraging knowledge. First, we need a common definition of the word *knowledge,* so we can define it as "information in context to produce actionable understanding." There are two primary forms of knowledge—explicit and tacit. Explicit knowledge encompasses things we know that we can write down, share with others, and put into a database. Tacit knowledge is what we do not know that we know, including know-how, rules of thumb, experience, insights, and intuition. Therefore, knowledge management is the systematic processes by which knowledge needed for an organization to succeed is created, captured, shared, and leveraged.[1]



- ***Welcome to the Engineer School Knowledge Network (ESKN)!***
  Please check back often as this Knowledge Network is still under development and new dynamic content is continually being added. ESKN will contain a wealth of information for Engineers and provide a vast network of links and knowledge repositories that will assist each and every Engineer throughout their career.
- Go to the ***Building Great Engineers*** AKO Site by clicking here. At this site, you can download the ***Building Great Engineers Campaign Plan*** and ***Building Great Engineers STRATCOM*** packages.
- ENFORCE 09 UPDATES: ENFORCE 09 will be held 20-24 April at Fort Leonard Wood. The conference will not be split based this year as it was in 2008 and the theme for the conference will remain focused on "Building Great Engineers." More to follow on the details of the agenda, but mark your calendars now.
- HOT!! CAC Website for the new FM 3-07 (downloadable copy available October 6), click here
- HOT!! CAC YouTube Channel and blog both now online! Click here to go to the YouTube site or here to visit the CAC blog!
- NEW: Commandant's Quarterly VTC Memorandum Teleconference (VTC) 2008-2009 posted! Download by clicking **here**

Welcome to the USAES Knowledge Network

Engineer Doctrine [including General Engineering, Combat Engineering, Geospatial Engineering, and Environmental Considerations] is managed by the MANSCEN Directorate of Training's Doctrine Division as part of the doctrine development process within TRADOC.

- Current and Draft Doctrine
- Engineer Doctrine Request for Information

HOT!! CAC Website for the new FM 3-07 (downloadable copy available October 6), click here
HOT!! CAC YouTube Channel and blog both now online! Click here to go to the YouTube site or here to visit the CAC blog!

Request for Information:

Please email leon.usaeshorfi@conus.army.mil to reach the USAES RFI POC or visit https://www.wood.army.mil/rfi2 and follow the instructions provided.

The MANSCEN Directorate of Training (MDoT) has consolidated academic records for the CBRN, Engineer, and Military Police schools. To receive a certificate or other student record for a professional development or functional course in the PME, send a request to the registrar via email at leon.mdotdocstmab@conus.army.mil

Engineer School Knowledge Network (ESKN)

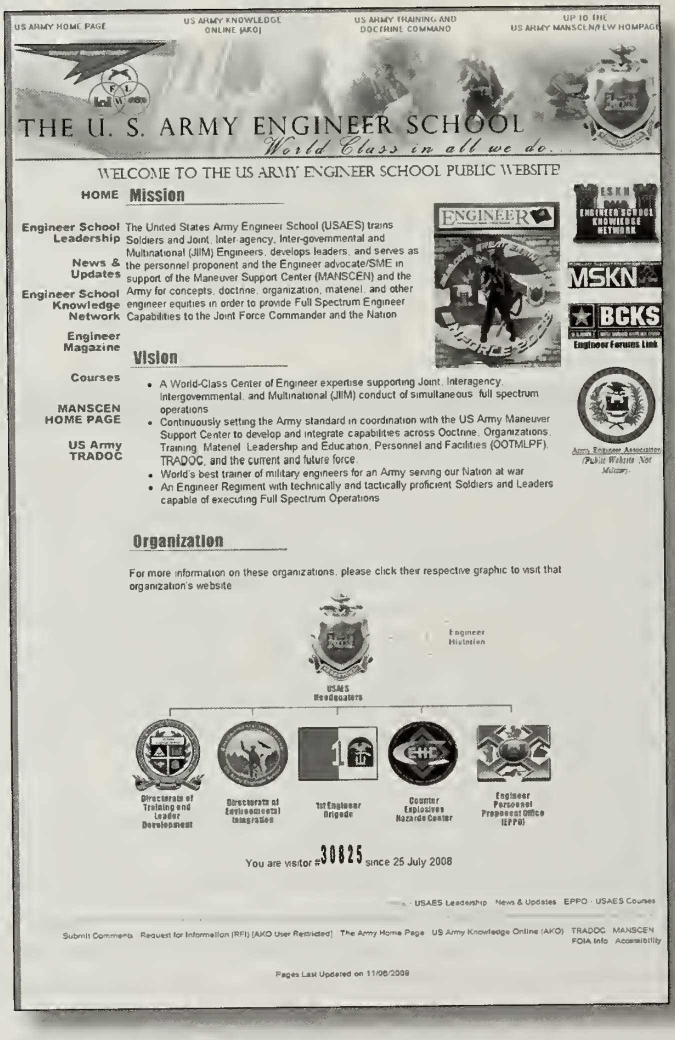
Undoubtedly, the people and teams here at the Engineer School and throughout the Engineer Regiment own and routinely manage both forms of knowledge and are hard at work developing better ways and means for their management. Using the power of Army Knowledge Online and its numerous tools and capabilities, the Engineer School has developed a single sign-on entry portal called the Engineer School Knowledge Network (ESKN). This portal, related to the Maneuver Support Knowledge Network, serves as the secure entry point for knowledge-sharing inside and outside of the Engineer School. Up-to-date announcements, links to communities of practice, forums, training materials, the latest doctrinal publications, the Engineer Systems Handbook, and engineer personnel proponency issues are all available directly from this site. Also, ESKN lets visitors solicit assistance or information directly from the Engineer School via a request-for-information interface. Another part of EKSN—the *Building Great Engineers* page—serves as the site for downloading the campaign plan as well as various strategic communications products.

Soon, all of the directorates within the Engineer School will have individual sites set up and linked to ESKN, with information and tools tailored specifically to their core missions. Lastly, efforts are underway to develop and post a secured version of ESKN on the Secret Internet Protocol Router Network (SIPRNET) for use by deployed members of the Engineer Regiment. This secured portal—ESKN-S—will help to facilitate the management of classified knowledge to include lessons learned; observations; best practices; and tactics, techniques, and procedures generated within each of the combatant commands. The direct link to ESKN is available on the Engineer School homepage at <*http://www.wood.army.mil/usaes*>.

We have also leveraged the power of the Battle Command Knowledge System under the Protection.Net forums to facilitate the exchange of knowledge and information in a forum-oriented environment. Within Protection.Net, we've created two initial topic areas—combat engineering and construction engineering—under the *Engineer Profession* heading. There are also useful discussions under the *Environmental* heading. These forums will help facilitate dynamic collaboration among members of the Engineer Regiment across the globe by generating immediate feedback, soliciting input and expertise, and sharing the knowledge of Engineer School subject matter experts.

Finally, we've taken great strides in completely revising our public-facing website, <*http://www.wood.army.mil/usaes*>, to a more static, content-driven interface for our external stakeholders. This site will be much less dynamic than ESKN and will not contain products for downloading. However, the site, with links to the 1st Engineer Brigade and other organizational websites, will be of vital importance to the Engineer School in providing timely information to family members about trainees, students, and key stakeholders from industry, academia, and our sister Services. This information will include graduation dates and related information.

In the very near future, all information related to ENFORCE will be published on a stand-alone public-facing website linked to the Engineer School public-facing website. This site will have a new permanent domain name—<*http://www.wood.army.mil/enforce*>—and will serve as a single-source repository for all ENFORCE information, to include agendas, schedules, key events, and registration information.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USAES Headquaters
Directorate of Training and Leader Development
Directorate of Environmental Integration
1st Engineer Brigade
Counter Explosives Hazards Center
Engineer Personnel Proponent Office (EPPO)

Mission

The United States Army Engineer School (USAES) trains Soldiers and Joint, Inter-agency, Inter-governmental and Multinational (JIIM) Engineers, develops leaders, and serves as the personnel proponent and the Engineer advocate/SME in support of the Maneuver Support Center (MANSCEN) and the Army for concepts, doctrine, organization, materiel, and other engineer equities in order to provide Full Spectrum Engineer Capabilities to the Joint Force Commander and the Nation

Vision

- A World-Class Center of Engineer expertise supporting Joint, Interagency, Intergovernmental, and Multinational (JIIM) conduct of simultaneous full spectrum operations
- Continuously setting the Army standard in coordination with the US Army Maneuver Support Center to develop and integrate capabilities across Doctrine, Organizations, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF), TRADOC, and the current and future force.
- World's best trainer of military engineers for an Army serving our Nation at war
- An Engineer Regiment with technically and tactically proficient Soldiers and Leaders capable of executing Full Spectrum Operations

Organization

For more information on these organizations, please click their respective graphic to visit that organization's website

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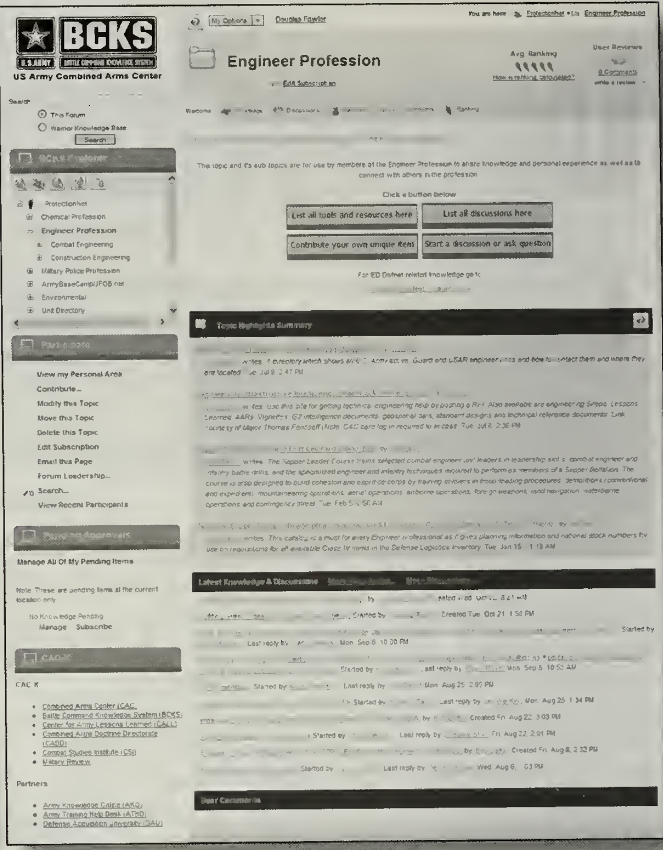
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This topic and its sub topics are for use by members of the Engineer Profession to share knowledge and personal experience as well as to connect with others in the profession.

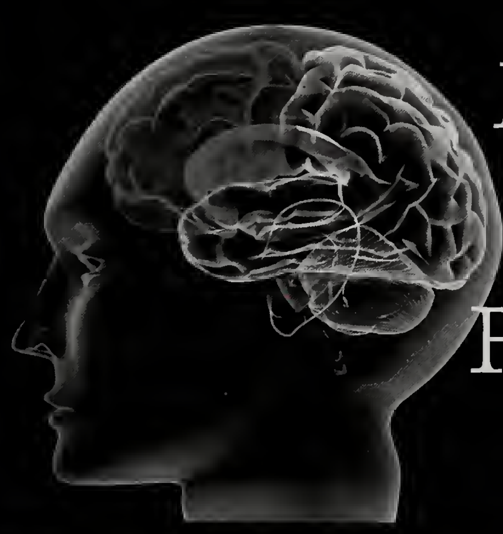
Battle Command Knowledge System (BCKS)

We encourage interested visitors and users of these sites to provide recommendations and suggestions on their content, capabilities, and functionality. Send suggestions or comments to <*leon.usaeshqrfi@conus.army.mil*>.

Mr. Fowler serves as Chief of Doctrine, Organizational Design, and Materiel at the Directorate of Environmental Integration, United States Army Engineer School, Fort Leonard Wood, Missouri. He also serves as the Engineer School's knowledge management organizational representative and senior advisor to the commandant on all knowledge management issues within the Engineer School. He is a graduate of the Army Management Staff College intermediate and advanced courses, holds a bachelor's in business administration, and is pursuing a master's in public administration.

Endnote

[1] Melissie Clemans Rumizen, *The Complete Idiot's Guide to Knowledge Management*, Penguin Group (USA) Incorporated, Madison, Wisconsin, 2002.



Mental Training for Combat Engineers: From the Classroom to the Battlefield

By Mr. Brian C. Hite

In an effort to raise the level of Soldiers' performance, the Army has introduced a program that addresses the mental and emotional aspects of their performance. The Army Center for Enhanced Performance (ACEP), an extension of the United States Military Academy's Center for Enhanced Performance (CEP), seeks to enhance Soldier performance by increasing awareness of the connection between mind and body. ACEP presents Soldiers with concepts and techniques designed to foster confidence, improve attention, manage energy levels, and facilitate learning by emphasizing how the mind and body interact to affect performance.

The ACEP staff, located at Fort Lewis, Washington, briefed the I Corps command group in November 2007. They described how a mental training program could be used by the various units on post. The commander of the 555th Maneuver Enhancement Brigade (Provisional) saw the potential of this program and asked that a trainer be assigned to work with one of the combat engineer units from Fort Leonard Wood, Missouri. He mentioned that the 5th Engineer Battalion had an upcoming National Training Center (NTC) rotation at Fort Irwin, California, and asked the ACEP trainer to Fort Leonard Wood to provide classroom training and accompany the unit to NTC.

In January 2008, an ACEP trainer flew to Fort Leonard Wood to provide mental training for the Soldiers of 1st Platoon, 55th Mobility Augmentation Company, 5th Engineer Battalion. The classroom training consisted of an informational brief coupled with hands-on exercises that allowed the Soldiers to put into practice the concepts they learned. The next month, the same trainer linked up with the Soldiers at NTC and conducted refresher training. Throughout the next 10 days, the trainer lived with the Soldiers and accompanied them on each mission to provide mental and emotional coaching. He was also a part of the after-action review (AAR)

Using biofeedback techniques, an ACEP trainer coaches Soldiers in the connection between mind and body.

process. Issues affecting the Soldiers' performances, such as negative thinking, lack of confidence, nervousness, anxiety, and lack of mission focus, were all discussed during the AARs and linked to aspects of the mental toughness training that address these issues.

The advice of the ACEP trainer had a profound impact on the Soldiers' performance during an urban operations training exercise. Each squad went through the exercise separately. During the first squad's initial dry-fire iteration, squad members appeared to be nervous, as evidenced by their poor communications techniques, excessively high energy levels, tendency to rush through each building, and failure to recognize potential threats. The squad proceeded through the iteration in a chaotic manner instead of performing as a smooth, controlled team. During the AAR, the observer/controller (O/C) pointed out the weaknesses and suggested a tactical pause before entering a room. The ACEP trainer repeated the O/C's comments about high energy levels and the tactical pause, but took the feedback a step further. He referred to the earlier mental toughness training and explained how having too much energy can negatively impact performance by restricting mission focus, slowing cognitive processing, and increasing muscle tension. He also noted how several of the mental training techniques the Soldiers had learned could be used to control energy levels and direct their attention.

A Soldier listens to a biofeedback training device.

The Soldiers followed the advice of the ACEP trainer and O/C, incorporating a routine during the tactical pauses before entering each building and room. The routine consisted of the squad leader saying, "Stack right [or left]. Slow is smooth; smooth is fast. Ready." The Soldiers would then inhale and exhale before the command of execution—"*Go!*" These actions addressed the issues of attention, anxiety, and nervousness by using a "cue phrase" (Slow is smooth; smooth is fast), and a calming breath that helped to direct attention to mission requirements and counter the physiological responses that accompany overly high energy levels, such as short, shallow breathing and muscle tension.

During the two hours between their first and second iterations, the Soldiers rehearsed their routine using glass house drills and mental imagery, and the improvement in their performance was amazing, according to the O/Cs. The officer in charge of the urban operations site said the Soldiers had rushed through their earlier clearance exercise, but that coaching, reiterating the cue phrase, and taking a tactical pause before clearing each area helped the Soldiers focus and regain control of their breathing and heart rate before moving to their next objective. That helped them move in a controlled manner, assess threats, and communicate more efficiently.

The ACEP mental training helped the Soldiers' performance in improvised explosive device defeat as well. One Soldier received a battalion coin after finding a piece of unexploded ordnance that an entire convoy of combat engineers had passed and missed.

Improved performance on missions, however, is not the only focus of ACEP training. It also teaches concepts and techniques to facilitate stress recovery following missions. The Soldiers engaged in stretching exercises and listened to relaxation compact disks (CDs) following missions. Many also used a biofeedback tool designed to increase their awareness of how their thoughts affect their bodies. One Soldier said the relaxation CDs helped get him calm and relaxed after a mission. Another Soldier commented that the biofeedback tool showed him which thoughts helped calm him and which thoughts were stressful. The ACEP training program provided the 5th Engineer Battalion Soldiers techniques for efficient, effective stress recovery.

Now that the Soldiers have learned how to apply the mental and emotional concepts and techniques related to peak performance and stress recovery in a training setting, the next step for ACEP is to help these Soldiers use these techniques in a combat setting. The ACEP trainer will maintain contact with the unit via regularly scheduled video teleconferences with the unit leaders to provide ongoing guidance, troubleshoot any issues that may arise in the future, and train new Soldiers when they arrive.

Mr. Hite is a performance enhancement specialist at the Army Center for Enhanced Performance at Fort Lewis, Washington. He holds a master's in sports psychology and is working on a doctorate in organizational psychology. Previously, he spent 13 years as a stuntman and stunt coordinator in movies and television.

Contracting Officer's Representative Training at the Engineer School

By Lieutenant Colonel Steven T. Wall and Major John N. Carey

More engineer officers, warrant officers, and noncommissioned officers (NCOs) are being assigned additional duties as a contracting officer's representative (COR). With an increasing reliance on private industry to perform services for the United States Army, the COR is an important part of the acquisition team.

A COR is authorized to be appointed by a contracting officer (KO) by authority of the Defense Federal Acquisitions Regulation Supplement to assist in the technical monitoring or administration of a contract. There is no certification as a COR until the KO designates a COR in a written letter that specifies the extent of the COR's authority to act on behalf of the KO. To prepare Soldiers for COR duties, the Army requires Defense Acquisition University (DAU) or equivalent courses as prerequisite training. The responsibilities of the COR vary with the type of contracting and normally include the following:

- Monitor the contractor's progress and performance, including the completion of required reports or other documentation.
- Verify that the contractor has performed the technical and management requirements of the contracting according to the contracting terms, conditions, and specifications.
- Accept for the government the supplies and services received, to include certifying receipt of the supplies and services.
- Maintain liaison and direct communications with the contractor and the KO.
- Recommend contracting modifications to the KO.
- Assist in meeting the government's contractual obligations to the contractor. This includes, but is not limited to, arranging to supply government-furnished equipment, facilities, and services called for in the contract.
- Provide technical interpretation of the contracting requirements.
- Maintain files and correspondence relating to the contracting performance.

The COR is not authorized to make any commitments or changes that will affect price, quality, quantity, delivery, or any other term or condition of the contract.

Contracting officers' technical representatives (COTRs) differ from CORs in that they have specialized technical knowledge, such as engineers and Soldiers with certain technical military occupational specialties, in overseeing a contract. Both CORs and COTRs require a KO's appointment in writing.

As of 17 November 2008, COR training with DAU must be completed before attending the Engineer Captain's Career Course (ECCC). This 20-hour block of instruction via web-based distributed learning was established in response to comments and suggestions from deployed units. The training program will require students to register and complete the following DAU online training:

- CLC 011—Contracting for the Rest of Us
- CLC 106—Contracting Officer Representative with a Mission Focus
- CLM 003—Ethics Training for the Acquisition Technology and Logistics Workforce
- CLM 024—Contracting Overview

These modules are not meant to be all-inclusive since KOs normally need further training, specific to the type and scope of the contract.

DAU COR training is available at <*http://www.atrrs.army.mil/channels/aitas*>. CORs must complete the DAU online course every three years. After successful completion, DAU provides the participant an online COR course completion certificate. As a result of finishing this activity before attending ECCC, students will now be able to complete further advanced training on contracting, acquisition, project management, joint engineering, and an appropriate language (Farsi, Pashto, Arabic, or Mandarin) during the course.

DAU COR training will be included in the Basic Officer Leader Course (BOLC) and NCO courses in the near future. The point of contact is Major Justin B. Putnam at <*justin.b.putnam@us.army.mil*>.

Lieutenant Colonel Wall is Chief, Assured Mobility Branch, Requirements Determination Division, United States Army Maneuver Support Center, Fort Leonard Wood, Missouri.

Major Carey is Division Chief, Engineer Captain's Career Course, Department of Instruction, United States Army Engineer School, Fort Leonard Wood, Missouri.

ENGINEER OPPORTUNITIES ON THE SOUTHWEST BORDER

BY MAJOR ALLISON DAY

Real-world homeland security support engineer missions abound for United States Army engineer units looking for additional training opportunities that are directly related to their mission-essential task list (METL). The missions have been useful for units preparing for and returning from overseas deployments.

The homeland support missions are offered by Joint Task Force (JTF) North, the Department of Defense organization that coordinates and manages the engineering support provided to the United States Border Patrol along the Southwest border. The training missions give Regular Army and Army Reserve engineers the opportunity to plan, deploy, execute, and redeploy as platoon-, company-, or battalion-size elements to the Southwest desert via self-deployment, military or commercial airlift, or a combination of both.

Of special interest to commanders facing limited training funds is the fact that JTF North funds all mission-related costs, to include travel, per diem, and other associated expenses. All costs for materials used on engineer support missions are paid for by the supported law enforcement agencies. As an added benefit, JTF North issues contracts for—

- Most of the heavy equipment.
- Required equipment maintenance and training.
- Support vehicles.
- Billeting at local hotels or military support facilities.
- Ration support.
- Commercial air.

Engineer projects range from building personnel and vehicular barriers to installing lighting and constructing drainage structures and service roads for the Border Patrol along the U.S.-Mexico border. Depending on their scope, missions can last from two weeks to 179 days. The majority of the engineer support missions are long-term operations that the United States Army Corps of Engineers and the Border Patrol plan one to two years before execution and can consist of multiple-phase operations that may take several months or years to complete. Units generally volunteer and enter the planning process six months before deployment. JTF North executes approximately 14 engineer support missions each year.

Navy Seabees construct drainage structures for the Border Patrol.

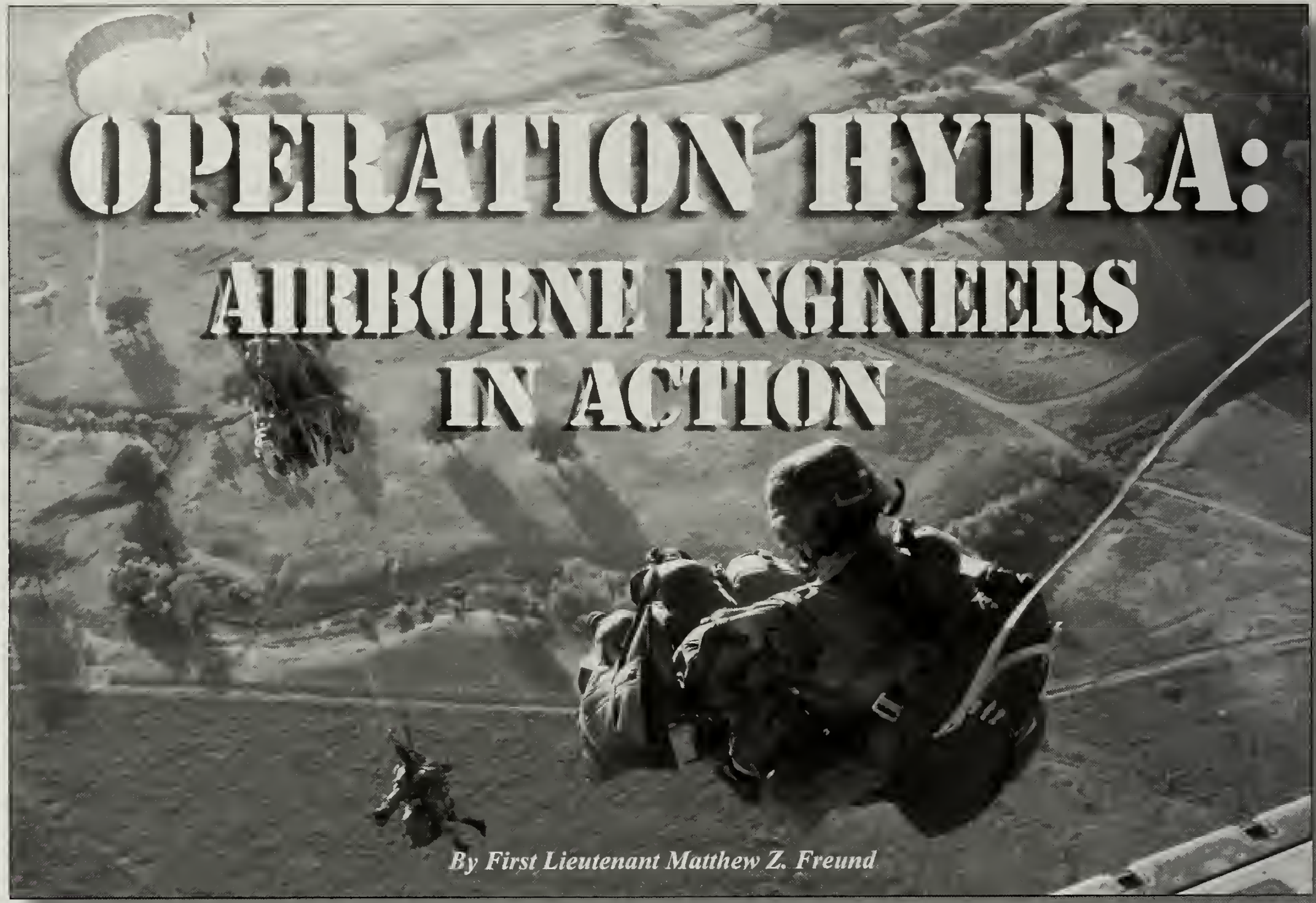
Joint Task Force North Background Information

Joint Task Force (JTF) North, based at Biggs Army Airfield, Fort Bliss, Texas, is a joint service command composed of Regular Army and Army Reserve Soldiers, as well as Sailors, Airmen, Marines, Department of Defense civilians, and contracted support personnel. All military support for homeland security is based on support requests and threat assessments submitted by the federal law enforcement agencies assigned to the Department of Homeland Security and Department of Justice. Assuming the support is appropriate and in compliance with the statutory guidelines for the domestic employment of military forces, JTF North seeks military units to volunteer to provide the requested operational support. Once a unit volunteers, JTF North facilitates mission planning and execution with the unit and the supported agency. According to Department of Defense policy, missions must have a training value to the unit or provide a significant contribution to national security.

The primary reason that units volunteer for the missions is that they typically get to train on 90 percent of their METL, to include individual and collective training. In their after-action reports, many commanders have commented that these missions resulted in the best engineer training they had ever conducted. Units also train on technical and project management skills that are difficult to practice in a combat training center environment. Overall, JTF North helps round out unit readiness.

For more information on JTF North and its engineering support missions, visit the command's website at: *<http://www.jtfn.northcom.mil>*, or contact the JTF North engineer planners at (915) 313-7787/7688 or DSN 666-7787/7688.

Major Day is an engineer planner with JTF-North. She has had command and staff experience in topographic and combat mechanized engineer battalions. Her most recent assignment was teaching in the Department of Geography and Environmental Engineering at the United States Military Academy at West Point, New York. She holds a bachelor's in forestry from the University of Missouri-Columbia and a master's in remote sensing and geospatial information management from the University of Wisconsin-Madison. She can be contacted at JTF North, Building 11603, Staff Sergeant Sims Street, Fort Bliss, Texas 79918-0058; by phone at (915) 313-7787; or fax at (915) 313-7687.



OPERATION HYDRA: AIRBORNE ENGINEERS IN ACTION

By First Lieutenant Matthew Z. Freund

For an airborne engineer unit like the 27th Engineer Battalion (Combat) (Airborne), trained to deploy tailored engineer packages anywhere in the world within 18 hours, readiness is the watchword. So when an emergency deployment readiness exercise (EDRE) sequence began on 7 July 2008, the battalion organized its equipment and personnel in less than a week to execute an airborne insertion into Fort Hunter Liggett, California, as part of a larger joint exercise named Operation Hydra. The training mission was the largest off-post airborne deployment of heavy equipment platforms projected from Fort Bragg, North Carolina, for a training mission since 1991. As one of only two airborne engineer battalions in the Army (both of which are stationed at Fort Bragg), the 27th Engineer Battalion has the special capability of conducting the full spectrum of combat and general engineering operations on short notice and in nearly any contingency. The battalion's mission, to upgrade Schoonover Assault Landing Zone (ALZ) at Fort Hunter Liggett, was structured around a notional humanitarian aid scenario.

Soldiers and Airmen have trained at Fort Hunter Liggett, located between the Santa Lucia Mountains and the Los Padres National Forest, since 1940. The post is used primarily for training United States Army Reserve units. The battalion's mission was to widen the crossovers and upgrade the parking apron to raise the maximum on ground (MOG) capability of the ALZ. The crossover and apron expansion increased the usable surface area by more than 25,000 square feet.

The airborne operation consisted of a drop of 127 paratroopers preceded by 10 heavy drop platforms totaling more than 300,000 pounds of engineer construction equipment. The heavy drops included a 950B wheel loader, two 130G motor graders, a deployable universal combat earthmover (DEUCE), a small emplacement excavator (SEE) truck, a 613B water distributor, and an equipment box. Within an hour of parachuting onto the ALZ, two sapper platoons had secured it with a 4-kilometer perimeter, allowing light equipment (LE) Soldiers to retrieve and remove the harnesses from dropped vehicles and equipment. The equipment box—packed with oils, lubricants, and tool boxes—was dropped so that LE Soldiers and mechanics could repair any damaged equipment on the drop zone. Only one of the ten heavy drop platforms—a dump truck—failed to land upright. However, a DEUCE soon arrived at the scene and an operator used its winch to pull the dump truck upright. The wheel loader's bucket and tines quickly moved the platforms from the ALZ centerline, clearing an unobstructed path for aircraft, which landed on the ALZ just a few hours after the jump.

Requirements for the ALZ repair and improvement were varied. First, two taxiways had to be widened by 30 feet. The apron required a 25,000-square-foot extension to increase its MOG. In addition, the apron and crossovers required resurfacing after 6 inches of soil were removed. Working in shifts, three LE platoons completed the mission after 60 hours of continuous operations. As surveyors plotted the dimensions,

A roller operator works on the apron of Schoonover Assault Landing Zone.

two scrapers hauled away 6 inches of soil (a total of 2,082 cubic yards) from the apron and crossovers, which covered 112,387 square feet. The apron's grade was designed to engineer technical letter standards of 1.0 percent to 3.0 percent to account for water runoff. After grading and scraping, the crossovers, apron, and shoulders were resurfaced with approximately 4,000 cubic yards of fill. An Air Force REDHORSE (rapid engineers deployable heavy operation repair squadron, engineer) civil engineering team from Nellis Air Force Base, Nevada, contributed to the mission by surveying, directing troops, and operating equipment.

The notional host nation, which received humanitarian assistance from the joint task force in the scenario, provided round-the-clock fuel and water resupply, allowing the battalion to conduct 24-hour operations throughout the mission. Host nation support units at Fort Hunter Liggett also provided additional graders, scrapers, vibratory rollers, and water distributors that allowed the unit to accomplish its mission in less than three days. Supply officers, who arranged for additional food, fuel, and equipment to be pre-positioned onsite, also located a maintenance contact truck that helped unit mechanics repair broken equipment. During the mission, mechanics repaired one grader and one roller, keeping operators at the wheel and preventing delays in the construction project.

While equipment operators repaired and improved the ALZ, crossovers, and apron, two sapper platoons conducted route reconnaissance and route clearance missions to ensure that the surrounding ground lines of communication were viable. After certification of the ALZ construction by an Air Force special tactics squadron, the engineers were airlifted by C-17 and C-130 aircraft to Castle Airport, a former Strategic Air Command base located just south of Merced, California. In short order, riggers from Fort Bragg's 612th and 647th Quartermaster Companies and 27th Engineer Battalion Soldiers prepared the unit's equipment for the trip back to Fort Bragg.

Earning the title "Tiger Battalion" in the 1960s for its reputation for executing demanding training, the 27th Engineer Battalion lived up to its name during Operation Hydra. Less than a week after notification, the battalion conducted an airborne assault with paratroopers and heavy equipment. In less than 72 hours, the battalion had improved and expanded Fort Hunter Liggett's landing zone, greatly increasing its maximum capacity. The successful execution of all missions displayed the battalion's ability to respond quickly to any call that requires its specialized skills.

First Lieutenant Freund is the executive officer of Charlie Company, 27th Engineer Battalion (Combat) (Airborne), Fort Bragg, North Carolina. Commissioned through the Army Reserve Officer Training Corps at the University of North Carolina at Chapel Hill, he is a graduate of the Ranger School at Fort Benning, Georgia, and the Advanced Airborne School's jumpmaster course at Fort Bragg.

Before Equipment and Training, There Must Be Engineering

By Major Thomas D. Heinold

The Multinational Security Transition Command–Iraq (MNSTC–I) has the mission "to assist the Iraqi government in the development, organization, training, equipping, and sustaining of Iraqi Security Forces (ISF) and ministries capable of defeating terrorism and providing a stable environment in which representative government, individual freedom, the rule of law, and the free market economy can evolve and which, in time, will contribute to Iraq's external security and the security of the Gulf Region." [1] None of this would be possible without facilities and the engineers it takes to plan, design, and construct them.

Fortunately, MNSTC–I has thought about that, even if it's only implied in the mission statement above. The engineer staff (J-7) is ready to provide the facilities needed to stand up a national defense system for Iraq. Two separate sides of the J-7 execute these programs: the Ministry of the Interior (MOI), which is focused on the Iraqi Police (IP), and the Ministry of Defense (MOD), which is focused on the armed forces. Headquartered at Phoenix Base in Baghdad's International Zone, the J-7 facilitates a program that builds everything from ablution facilities to ranges The MNSTC–I J-7 supports the headquarters and subordinate transition teams by providing suitable and lasting infrastructure for the ISF by planning, budgeting, and executing an infrastructure program with coalition and Iraqi funding. The J-7 also supports the ISF ministerial transition team mission with mentorship in the following areas:

- Infrastructure
- Long-term programming
- Policies
- Budgeting
- Execution
- Accountability
- Recapitalization programs
- Maintenance programs

The MOI section is primarily in charge of facilities for the IP, which involves police stations, training academies, ranges, and border forts. Iraq shares borders with Saudi Arabia, Jordan, Syria, Turkey, Iran, and Kuwait, so the IP have their hands full patrolling and manning border checkpoints. They ensure that no weapons of mass destruction are transported to support Al Qaeda or other terrorists, maintain order, and enforce trade and transportation laws. In addition to the facilities at road and pipeline crossings at the borders,

Facilities for an Iraqi army infantry brigade include billeting, dining facilities, headquarters and administration buildings, maintenance bays, and a fuel station.

project is completed, and determining the delivery date required.

There is such a staggering volume of effort required to provide facilities for all of the Iraqi security elements that very often the required delivery date has passed and there are already Iraqi units that need the facilities. In these cases, the J-7 has to prioritize work and request the shortest possible contract periods of performance while still providing a safe, quality project that will provide years of service. In a high operating tempo environment, the process is quicker than similar processes back home. Projects that would normally take months or even years to authorize and fund in a peacetime stateside environment may take only days in Iraq. Similarly, military construction projects that would take years on American soil may only take months in Iraq.

This obstacle course for an Iraqi army infantry division is under contract to an all-Iraqi construction company.

internal security is also required. As the Iraqis stand up additional police forces and are issued new equipment, they need places to train, maintain, and operate those forces. The J-7 MOI is delivering on all counts.

The MOD section services the needs of the Iraqi armed forces, to include the following:

- Iraqi Ground Forces Command
- Director General of Intelligence Services
- Iraqi MOD
- Iraq's 13 Army divisions
- Iraqi Air Force
- Regional training centers
- Divisional training centers
- Iraqi Army Service Support Institute
- National maintenance and supply depots
- Besmaya Range Complex
- Other facilities required to build a trained, equipped, and sustainable armed force.

Once a requirement is identified—whether for billeting space, maintenance facilities, offices and administrative buildings, or training areas—the J-7 MOD works with the requesting organization to develop the requirement. This includes examining whether the Iraqis can use existing facilities, deciding if it would be more economical to renovate existing facilities or build new ones, answering questions about what the Iraqis will be able to operate and maintain in the long term once the

Between the MOI and MOD sections, the J-7 engineers have completed more than 520 construction projects valued at more than $1.5 billion. To deliver all of the requirements not yet met, they are now managing the ongoing development, acquisition, and construction of more than 220 projects. MNSTC–I is helping to build up the Iraqi capability for future construction contracting. More and more work is being done by Iraqi firms that have been working alongside U.S. contractors in Iraq, and the unskilled laborers hired for many projects obtain valuable on-the-job training that can qualify them as skilled laborers.

As the skilled labor base develops, Iraqi firms are beginning to assemble capable workforces that can deliver construction projects. Although it takes extra effort to overcome the language barrier and enforce contract standards that are new to the Iraqis, the effort will pay off in the long run. The Iraqi government will develop a contracting system, Iraqi contractors will become more capable, and U.S. forces will be able to step out of the picture and hand over the J-7 functions of the MNSTC–I to the Iraqis. One such success story is a Joint Contracting Command–Iraq/Afghanistan project that was awarded to an all-Iraqi company. Although most people thought the period of performance given to the contractor was practically unattainable, the J-7 established effective communication with the contractor and helped him through a new submittal process. After 60 days, the contractor was nearly finished constructing an obstacle course for divisional unit training at the Besmaya Range Complex, which is akin to the United States Army's National Training Center.

The contract development cell (CDC) is a J-7 section dedicated to tracking new requirements, developing contract documents to meet those requirements, deciding upon the contract vehicle, coordinating with other MNSTC–I sections to ensure that they have provided authorization and funding for the requirements, and executing the contracting process to deliver the facilities needed by the Iraqis. The cell is a team of senior engineers and technicians working with elements within the MNSTC–I, which in turn works with the Iraqis and identifies what their facilities needs are. Those elements include the following:

- MNSTC–I supply/logistics
- Coalition Army, Air Force, and Navy transition teams
- Intelligence Transition Team
- MOD Advisory Team
- Coalition Police Assistance Transition Team
- Other advisory groups to the ISF that work to develop force generation plans, training plans, and schedules for equipping troops
- Any agency that requires facilities or infrastructure

The next step is approval by a program, budget, and acquisition council, a senior-level working group that meets within MNSTC–I to ensure that funds are spent appropriately. Once the element that originated the requirement gets council approval, it requests funding and provides an approved funding document to the finance section, which then funds the appropriate contracting agency. Then the cell goes to work, developing the statement of requirements or plans and specifications as appropriate, choosing the most appropriate or efficient contracting method, and following through with the contracting agency to get the project out for bids.

Keeping track of requirements is increasingly difficult as Iraqi forces stand up, identify new needs, and deploy to the front lines to fight the War on Terrorism. The J-7 works closely with the Coalition Air Force Training Team and the Coalition Army Advisory Training Team to provide facilities that support Iraqi force generation and force sustainment. As the Iraqis increase their capabilities, they constantly change or update their missions and often deploy to take on the counterinsurgency and counterterrorism fights. At times, this leaves vacant some of their basing infrastructure, so there is a constant need to reutilize or rehabilitate existing facilities, or construct new facilities to enhance the flexibility of those who will soon assume the security mission here.

MNSTC–I uses three main contracting vehicles: the United States Army Corps of Engineers Gulf Region Division, the Joint Contracting Command–Iraq/Afghanistan, and the Air Force Center for Engineering and the Environment. The J-7 works closely with all three to ensure that—

- Contracts are solicited and bids submitted in a timely manner.
- Delivery dates are coordinated with the needs of the Iraqi forces using the projects.
- Projects are supervised and administered closely to meet the specifications and deadlines in the contracts.

Ever since the invasion in 2003 decimated Saddam's armed forces, coalition forces have been in Iraq fighting terrorism, keeping the peace, and rebuilding the country. Not all of the construction is funded with U.S. dollars though. As the Iraqi government becomes more capable, more Iraqi money is funding projects, and U.S. funding is falling off. For the first few years of Operation Iraqi Freedom, U.S. funding constituted nearly 100 percent of the projects built for Iraq. However, there are no new requirements now being delivered with U.S. dollars. More and more, the Iraqi MOI and MOD are authorizing cases for the Foreign Military Sales program. These cases begin with a letter of request that identifies a requirement, which leads to the actual authorizing document, a letter of offer and acceptance. After that letter is signed, the Iraqi government provides funding to the American government, and MNSTC–I executes the requirement.

Although the government of Iraq is starting to develop capabilities for its own construction contracting, coalition forces still possess a unique capability that the Iraqis do not yet have up and running. Although U.S. expenditures are starting to shrink for MNSTC–I, the J-7's task will remain the same—to deliver the facilities the Iraqi forces need. Until the Iraqi forces have the facilities they need, the J-7 will remain poised to deliver them so that Iraq can equip and train its forces to assume full responsibility for the security mission in their country.

Major Heinold serves with the MNSTC–I J-7 (Engineer) Coalition/Joint Staff. He has been a mechanized engineer platoon leader and company executive officer with the 10th Engineer Battalion in Schweinfurt, Germany; an assistant battalion operations officer and engineer company commander with the 44th Engineer Battalion at Camp Howze, Korea; a project engineer and program manager with the Rock Island District of the United States Army Corps of Engineers Rock Island District; a task force engineer with Joint Task Force Shining Hope in Kosovo; a battalion operations officer with 13th Battalion (Combined Arms and Services Staff School); a battalion detachment commander of 11th Battalion (Command and General Staff College); a facility engineer with the United States Army Facility Engineer Group; and a Command and General Staff College instructor. He holds a bachelor's from the United States Military Academy at West Point, New York, and a master's from the University of Missouri–Rolla (now Missouri University of Science and Technology). He is a registered professional engineer in Illinois.

Endnote

[1] Multinational Security Transition Command–Iraq mission statement, "Multinational Security Transition Command–Iraq directorate pages," <*http://www.mnstci.iraq.centcom.mil*>.

Letter To The Editor

Fueling the Front Lines: Army Pipeline Units

I recently finished reading the article “Fueling the Front Lines: Army Pipeline Units” by Mr. Thomas J. Petty in the January–March 2008 issue of *Engineer*. I just wanted to let you know that the active Army did stand up another pipeline company, although it was only briefly. The 585th Engineer Company (Pipeline) “Roughnecks” was stood up in late 2005, originally under the 23d Chemical Battalion at Fort Lewis, Washington.

In 2006, the 585th completed a joint training exercise that involved constructing aluminum pipe. The company also transferred to the 864th Engineer Battalion (Heavy) in the spring of 2006. In November 2006, the 585th deployed to Afghanistan in support of Operation Enduring Freedom. The Roughnecks successfully completed a 15-month tour and returned to Fort Lewis in February 2008. In September 2008, the 864th Engineer Battalion transformed from a combat heavy battalion to the new combat effects battalion. As part of the transformation, the 585th was transformed from a pipeline company to a vertical construction company. To the best of my knowledge, the active Army is once again left without a pipeline company. I only had the privilege of serving in the 585th for a few months as a second lieutenant before I transferred to another company in the 864th.

I thoroughly enjoyed the article on the history of the pipeline companies, and I commend Mr. Petty on his service.

Captain Robert W. Green
Battalion Construction Officer
864th Engineer Battalion

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Alfonso, Specialist Carlo E.	40th Engineer Battalion, 2d Brigade Combat Team	Baumholder, Germany
Badie, Private First Class David J.	Special Troops Battalion, 3d Brigade Combat Team	Fort Hood, Texas
Barnett, Private Charles Y.	12th Cavalry Regiment, 4th Brigade Combat Team	Fort Hood, Texas
Bryant, Private First Class Jamel A.	40th Engineer Battalion, 2d Brigade Combat Team	Baumholder, Germany
Bull, Sergeant Douglas J.	Special Troops Battalion, 3d Brigade Combat Team	Fort Hood, Texas
Girdano, Second Lieutenant Michael R.	Special Troops Battalion, 3d Brigade Combat Team	Fort Hood, Texas
Gulczynski, Private First Class Leonard I.	14th Engineer Battalion, 555th Engineer Brigade	Fort Lewis, Washington
Hutton, Private Timothy J.	54th Engineer Battalion, 18th Engineer Brigade	Bamberg, Germany
Jackson, Private James	14th Engineer Battalion, 555th Engineer Brigade	Fort Lewis, Washington
Johnson, Specialist Geoffrey G.	Division Special Troops Battalion, 4th Infantry Division	Fort Hood, Texas
McHale, Sergeant James A.	40th Engineer Battalion, 2d Brigade Combat Team	Baumholder, Germany
Setzler, Private First Class Tavarus D.	7th Cavalry Regiment, 4th Brigade Combat Team	Fort Hood, Texas
Smith, Sergeant Timothy M.	4th Brigade Special Troops Battalion, 4th Brigade Combat Team	Fort Polk, Louisiana
Smith, Private First Class Tyler J.	3d Battalion, 7th Infantry Regiment, 4th Brigade Combat Team	Fort Stewart, Georgia
Stanciel, Sergeant First Class George	54th Engineer Battalion, 18th Engineer Brigade	Bamberg, Germany
Wright, Captain Darrick D.	Headquarters and Headquarters Company, 926th Engineer Brigade	Montgomery, Alabama

2008 Army Deployment Excellence Awards

By Mr. Henry H. Johnson

The 2008 Chief of Staff, Army Combined Logistics Excellence Award ceremony and banquet was held at the Hilton Alexandria Mark Center Hotel in Alexandria, Virginia, on 3 June 2008. Lieutenant General (LTG) Ann E. Dunwoody, Deputy Chief of Staff, G-4, hosted the event and recognized winners and runners-up in the areas of maintenance, supply, and deployment excellence. The Deployment Excellence Award (DEA) recognizes Army units and installations (Active Army, Army Reserve, and Army National Guard) for outstanding accomplishments that meet or exceed Army deployment standards (see table on page 35). The program is meant to enhance unit and installation deployment skills and proficiency, share innovative deployment initiatives, and capture deployment training trends.

LTG Stephen M. Speakes, Deputy Chief of Staff, G-8, congratulated the awardees on behalf of General George W. Casey, Army Chief of Staff. He delivered the keynote address to an audience of congressional dignitaries, senior Army generals, senior executive civilians, and a host of Soldiers, Family members, and friends. LTG Speakes thanked LTG Dunwoody for the opportunity to address the lifeblood of the Army, "the logistical community and our partners in the industry."

He said that "Logistics is a noble profession that dates back to Roman times, where early efforts at logistics transformed armed mobs to a sustained military capability. Since then, wars have been won and lost based on the ability to support the force. Since those times, we refined those procedures for the warfighter in Operation Iraqi Freedom and Operation Enduring Freedom. Behind every operation is a sea of human faces making the impossible happen—the men and women who are my heroes."

Winning units and installations received a personalized note from the Army Chief of Staff, the Combined Logistics Excellence Award program commemorating the unit's accomplishment, a plaque, and a coin set that included coins from the Army Chief of Staff; Sergeant Major of the Army; Deputy Chief of Staff, G-3; and Deputy Chief of Staff, G-4. Winners and runners-up received a three-night stay at the luxury Hilton Alexandria Mark Center Hotel and toured the Pentagon, the Capitol Building, the National Mall, and other places of interest in Washington, D.C. In addition, they attended the "Twilight Tattoo," a colorful military pageant held at the Jefferson Memorial.

The awardees' celebration concluded with a banquet in their honor, hosted by Army Deputy Chief of Staff, G-4, which included congratulations from keynote speaker General Benjamin Griffin, Commanding General, United States Army Materiel Command, and entertainment by the Army's Down Range Chorale.

The 2009 Deployment Excellence Award competition is now open to Active Army, Army Reserve, and Army National Guard units and installations that execute or support a training or contingency deployment or redeployment during the competition year. All units and installations are encouraged to plan now to compete in this elite contest.

The significant dates for the 2009 competition are as follows:

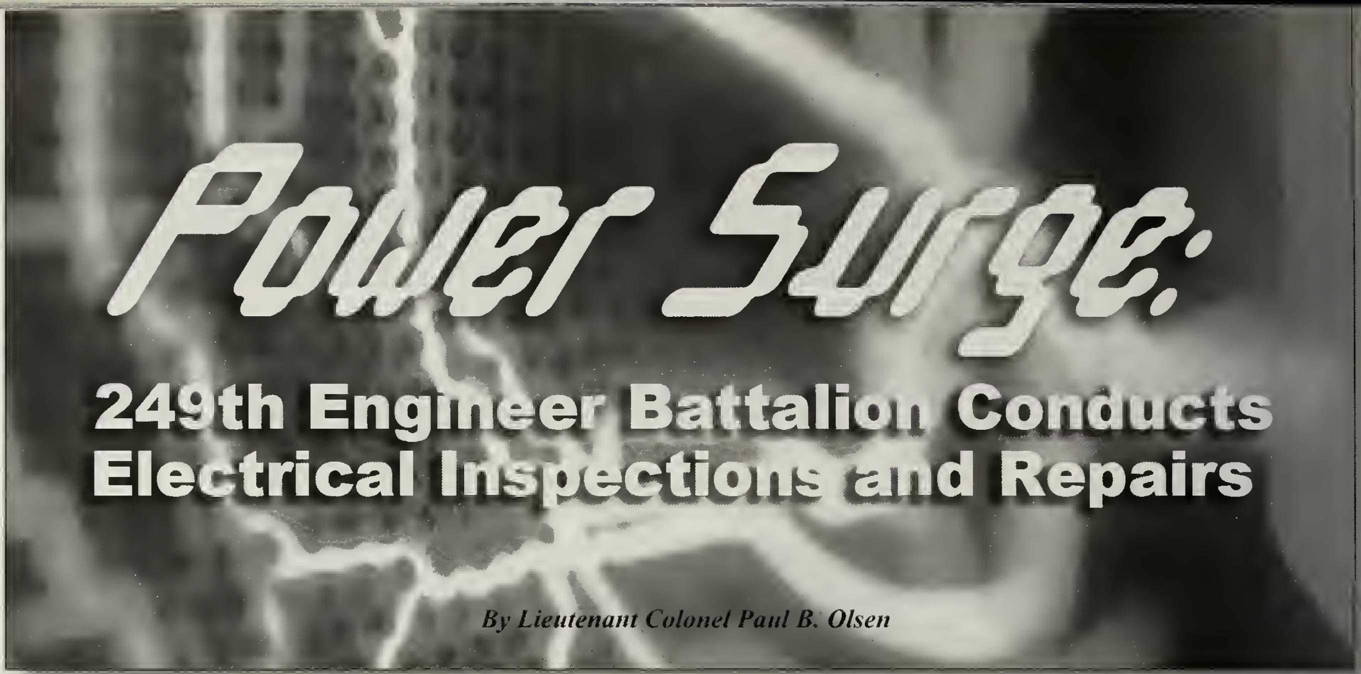
- 1 December 2007–30 November 2008: Competition period.
- 1 December 2008 - 25 January 2009: Submit unit packets to higher headquarters.
- 31 January 2009: Army Command, Army Service Component Command, and Direct Reporting Unit-selected nomination packets are due to the DEA evaluation board.
- 9-20 February 2009: DEA board.
- 4-27 March 2009: Validation team visits.
- 13 April 2009: Winners announced.
- 2 June 2009: Awards ceremony and banquet.

The DEA letter of instruction contains detailed guidance/instructions for competing units and installations and is available at <*https://www.eustis.army.mil/deploy*>. For additional information, contact the DEA Program Manager, ATTN: Mr. Henry Johnson, Building 705, Room 215, Fort Eustis, Virginia 23604, DSN 826-1833 or commercial 757-878-1833.

Mr. Johnson, a retired command sergeant major, is the Deployment Excellence Award Program Manager at the Deployment Process Modernization Office, Fort Eustis, Virginia.

2008 Deployment Excellence Award Recipients		
Category	**Winner**	**Runner-Up**
Active Large Unit	44th Expeditionary Signal Battalion 7th Signal Brigade Mannheim, Germany	1st Special Troops Battalion 1st Sustainment Command Fort Bragg, North Carolina
Active Small Unit	497th Transportation Company 57th Transportation Battalion Fort Lewis, Washington	89th Transportation Company 6th Transportation Battalion Fort Eustis, Virginia
Active Support Unit	180th Transportation Battalion Fort Hood, Texas	838th Transportation Battalion Rotterdam, the Netherlands
Army Reserve Large Unit	1185th Transportation Terminal Brigade Lancaster, Pennsylvania	3d Medical Command Third Army Forest Park, Georgia
Army Reserve Small Unit	322d Maintenance Company Arden Hills, Minnesota	828th Quartermaster Company Wilkes-Barre, Pennsylvania
Army Reserve Support Unit	Headquarters, Headquarters Company Civil Affairs Command Fort Bragg, North Carolina	1394th Deployment Support Brigade Camp Pendleton, California
National Guard Large Unit	41st Infantry Brigade Combat Team Tigard, Oregon	141st Brigade Support Battalion Portland, Oregon
National Guard Small Unit	730th Quartermaster Battalion Ahoskie, North Carolina	Headquarters, Headquarters Detachment 1144th Transportation Battalion Delavan, Illinois
National Guard Support Unit	Joint Forces Headquarters-Minnesota Little Falls, Minnesota	Joint Forces Headquarters-South Carolina Columbia, South Carolina
All Army Installation (Tie)	Fort Stewart, Georgia Fort Hood, Texas	NA
Operational Deployment	3d Armored Cavalry Regiment Fort Hood, Texas	NA
Operational Deployment	66th Engineer Company 2-25th Brigade Combat Team Schofield Barracks, Hawaii	NA

Illustration by Mica Angela Hendricks



Power Surge:

249th Engineer Battalion Conducts Electrical Inspections and Repairs

By Lieutenant Colonel Paul B. Olsen

During the summer of 2008, national news outlets were not covering the civil engineering successes being achieved by the United States Army Corps of Engineers (USACE) and units of the Engineer Regiment throughout Iraq, but rather a troubling electrical engineering situation emerging within the base camps housing U.S. forces. Since the beginning of Operation Iraqi Freedom, 16 U.S. personnel had been fatally electrocuted in Iraq, including 10 Soldiers, 5 Marines, and a Defense Department contractor.

In response to these tragic fatalities, Multinational Force–Iraq (MNF–I) stood up and now leads Task Force Safe Actions for Fire and Electricity (TF SAFE) to mitigate the risk of accidental electrocution of deployed personnel. Today, TF SAFE is proving to be a unique partnership between MNF–I, the Defense Contract Management Agency (DCMA), and USACE. This partnership highlights the technical skills of its first responders, the noncommissioned officers (NCOs) of the 249th Engineer Battalion (Prime Power).

Scoping the Problem

The electrical problems in Iraq are enormous in their number and complexity. Engineers and planners for TF SAFE, USACE, and the 249th Engineer Battalion (known as the "Black Lions") continue to tackle this theaterwide problem, which includes hundreds of contingency operating locations, thousands of buildings, and tens of thousands of temporary facilities. All of these facilities require electrical safety inspections. To immediately establish a safety mindset among Soldiers in-theater, the commander of TF SAFE initiated a theaterwide awareness program to halt the use of unauthorized electrical equipment usage such as daisy-chained power strips and illegal hot plates. Additionally, TF SAFE purchased tens of thousands of certified pieces of equipment, such as fuse-protected power strips and outlet adaptors, to exchange at no cost with Soldiers for noncertified equipment previously available for purchase in-theater.

Senior leaders understood that electrical hazard awareness and equipment exchange programs can only do so much. They felt that the root cause for the accidental shocks and electrocutions could be traced to the improper electrical wiring of temporary U.S. facilities. Recent statistics support their conclusion, indicating that the majority of reported electrical shocks occurred while Soldiers conducted daily tasks in container express (CONEX) units, containerized housing units (CHUs), and ablution (AB) or hygiene units.

Electrical shocks in facilities are avoidable. In certain cases in-theater, improperly wired CONEX, CHU, and AB units—combined with equipment failures—resulted in electrocutions. This could have been avoided in certain cases through the emplacement of proper electrical bonding and grounding systems. The proper electrical wiring of CONEX, CHU, and AB units mitigates the risk of future accidental electrocutions. A safely wired facility is considered "bonded and grounded" with the presence of a wiring system that permanently joins all metallic parts within a facility or unit and provides a safe path for electrical current to travel back to its source, or to the ground. Before bonding and grounding inspections and repairs could commence, a theaterwide electric code was needed to determine the inspection and repair standards, and that code would be the National Electric Code (NEC). With this standard in place, TF SAFE and USACE leaders focused training on NEC bonding and grounding compliance to inspect, report, and repair the wiring problems.

Providing Technical Competence

The 249th is a versatile power generation battalion assigned to USACE to provide commercial-level power to military units and federal relief organizations during full spectrum operations. When ordered to deploy to TF SAFE, the battalion and its eight active platoons were experiencing an extremely high operations tempo. The equivalent of one platoon was supporting Operation Enduring Freedom, including an emergency power plant installation. Two platoons were already deployed to support Operation Iraqi Freedom, with two more platoons replacing them. The equivalent of one platoon was preparing to deploy on a separate overseas mission and other missions all over the world. With Hurricanes Gustav, Hanna, and Ike brewing, one platoon was being held in reserve in case it was needed stateside. The battalion had one remaining platoon available for duty with TF SAFE.

The deployment of this platoon signaled the initial USACE support response to TF SAFE. On 6 September 2008, the platoon of 14 NCOs from Alpha Company, 249th Engineer Battalion, traveled from Schofield Barracks, Hawaii, to Winchester, Virginia, to attend a week-long deployment preparation course, as well as initial bonding and grounding instruction. The platoon arrived in Kuwait by 14 September to certify on theater-required Warrior Tasks and reported to TF SAFE in Baghdad on 19 September, one day ahead of schedule. Two senior NCOs from Bravo Company, 249th Engineer Battalion, augmented TF SAFE to form its operations cell.

Electricians from across USACE followed the 249th Engineer Battalion Soldiers. Under a refined deployment plan, all inspectors first travel to the USACE Deployment Center at Winchester, Virginia. There they get uniforms, equipment, and refresher training on bonding and grounding before deploying to Victory Base. The USACE plan is to send approximately 125 electricians and 37 fire protection personnel to TF SAFE by December 2008.

Providing Organizational Competence

While the platoon from Alpha Company and the initial USACE electricians were deploying, TF SAFE wasted no time in its preparations to begin NEC compliance inspections. Although the inbound inspectors were current with the bonding and grounding requirements of the NEC, additional theater-specific training was required. A second one-week training course under the instruction of a master electrician/certified inspector and a DCMA electrical engineer prepared the inspectors for what they would soon see in-theater. On 25 September 2008, TF SAFE graduated its first class of 14 inspectors from the 249th Engineer Battalion. These 14 Black Lions were divided into two groups to better address the two categories of TF SAFE inspections. Ten Soldiers would respond to the facilities under the Logistics Civil Augmentation Program (LOGCAP) contract to ensure contractor compliance with the NEC, and four would respond to facilities not under LOGCAP contract to oversee the repair of noncompliant electrical systems. The command and control task was overseen by the 249th Engineer Battalion's liaison officer and two NCOs.

Using a 21-point inspection checklist, the 249th Engineer Battalion NCOs inspected a large group of CHUs on Victory Base. They found that the majority of the units were not properly bonded because they were missing a bonding jumper wire common to most NEC-compliant distribution panels. Although this fault only requires a 10-minute fix, it may be a common problem throughout the thousands of CHUs in-theater.

Photo by Lieutenant Colonel Paul B. Olsen

Haphazard wiring at a former Iraqi army facility

Early inspection results from contingency operating locations (non-LOGCAP facilities) suggested a more serious problem. Some electrical work at these small, strategic bases was not in compliance with the NEC, or with any code for that matter. In defense of the commanders of the area of operations, the noncompliant electrical work was often the result of a successful counterinsurgency tactic: to support emerging Iraqi micro-economies, the Commander's Emergency Reconstruction Program allows local contractors to do electrical work. In the case of all inspections, when severe faults (those that pose a dire threat to life) are identified, the 249th Engineer Battalion NCOs and USACE electricians immediately repair them. Lower risk faults are prioritized and repaired by contracted electricians or, in the case of area of operation commanders, directed to be repaired by qualified military electricians.

Conclusion

Although TF SAFE cannot reverse the tragic electrocutions of 16 U.S. personnel, its work highlights the ability of USACE and DCMA to successfully cooperate to counter the significant theaterwide challenge posed by accidental electrocutions. Soldiers in the grade of specialist and sergeant interested in joining the 249th Engineer Battalion should contact Command Sergeant Major Clint Pearson at <*clinton.pearson@us.army.mil*>.

Lieutenant Colonel Olsen commands the 249th Engineer Battalion (Prime Power). He holds masters' in business management and civil engineering and is a licensed professional engineer in Virginia.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Jan 04	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** The estimated date for posting to Army Knowledge Online (AKO) is Winter 2008/2009.
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations – Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** The estimated date for posting to AKO is Spring 2009.
FM 3-34.23 (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations – Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15 and FM 5-116. **Status:** Preparing the final draft for staffing.
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations.* Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. **Status:** On hold for release of FM 3-90, *Tactics.*
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sept 94 Mar 85	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE). **Status:** On hold for release of FM 3-90, *Tactics.*
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This manual provides survivability information needed by commanders and staff at the tactical level. It includes guidance on integrating survivability into planning and order production and creation of the engineer running estimate. It provides examples of a survivability capabilities card, matrix, and timeline to assist with the planning, revision, and conduct of specific survivability tasks. **Status:** On hold for release of FM 3-10, *Protection.*

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
Combat Engineering (continued)			
FM 3-34.281 (FM 20-11)	*Military Diving*	Jan 99	This manual, formerly an adaptation of the Navy diving manual, will support one of the modular units of the MEF. Within the Army, it is used by special operations forces, as well as engineer divers. The entire Navy diving manual will not be adopted; instead, the targeted sections applying to Army diving use will be adopted with other Army-specific considerations being added. **Status:** Final draft; expect publication in Spring 2009.
General Engineering			
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This manual describes the operational environment (OE) and how to apply and integrate general engineering principals in support of full spectrum operations. It focuses on the establishment and maintenance of lines of communications and engineer support to sustainment operations throughout the area of operation. Although not designated as a multi-Service publication, it is intended to inform all Service components of the types of general engineering tasks, planning considerations, the variety of units available to perform them, and the capabilities of Army engineers to accomplish them. **Status:** The estimated posting to AKO is Spring 2009.
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Navy plans to adopt it as well. **Status:** Adjudicating comments on the final draft.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. **Status:** Adjudicating comments on the final draft.
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and includes the newest technologies and current practices. **Status:** Preparing the final draft for staffing to the force.
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This is a collaborative effort with the Navy and includes the newest technologies, current practices, and revised formulas. **Status:** The estimated date for posting to AKO is Spring 2009.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	This manual gives directions on deploying and using engineer firefighting teams. These teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a theater of operation (TO). This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status:** Initiating the program directive and developing the initial draft.
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** The estimated date for posting to AKO is Spring 2009
Geospatial Engineering			
FM 3-34.600 (FM 3-34-230)	*Geospatial Operations*	3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, Engineer Operations, and FM 3-0, *Operations*. Geospatial engineering consists of those engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Preparing the initial draft.

NOTE: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 5 November 2008.

Engineer Doctrine Contact Update

The Engineer Doctrine team would like to introduce to the Regiment its newest member, Mr. Doug Merrill, who is taking over from Mr. Jeff Beacham as the Engineer Senior Doctrine Analyst. Doug's Army Knowledge Online (AKO) contact information is <*douglas.merrill@us.army.mil*>. If you haven't already, you will soon begin to see the staffing of draft doctrine coming to you from Doug.

A new Maneuver Support Knowledge Network (MSKN) website has been established for Engineer Doctrine. There you can download the current manuals in the Engineer Doctrinal Hierarchy, as well as drafts of the various manuals under revision, and can stay updated on the status of those revisions and view the final comment matrices on each draft. The page may be reached through the MSKN homepage or via this link, which goes directly to the Engineer page vice the MSKN homepage after AKO login: <*https://www.us.army.mil/suite/page/500629*>.

The Engineer Doctrine element is the lead for the Regiment's doctrine. The Engineer School's Doctrine Division is consolidated at the MANSCEN level within the MANSCEN Directorate of Training (MDoT) Doctrine Division. The telephone numbers for Engineer Doctrine are—Doctrine Chief, (573) 563-7537; Senior Doctrine Analyst, (573) 563-0003 (DSN prefix, 676-).

The mailing address for written correspondence is: Commandant, United States Army Engineer School, ATTN: ATZT-TDD-E, 320 MANSCEN Loop, Suite 220, Fort Leonard Wood, Missouri 65473-8929.

For electronic correspondence, the generic NIPR e-mail address has changed to <*leon.mdottddengdoc@conus.army.mil*>.

Engineer Training at NTC

By Major Larry J. Lyle, Jr.

The National Training Center (NTC) at Fort Irwin, California, remains at the forefront of training for the War on Terrorism. Rotational unit training is conducted in conjunction with the latest tactics, techniques, and procedures (TTP) from the Iraq and Afghanistan theaters, as well as current and emerging doctrine using situational training exercises (STXs) and full spectrum operations mission rehearsal exercises (MREs). The training is now embedded with a set of counterinsurgency (COIN) fundamentals based on Field Manual 3-24, *Counterinsurgency*. NTC can train all types of engineer units, to include the following:

- Mobility augmentation companies
- Horizontal/vertical construction companies
- Organic maneuver brigade engineer companies

The purpose of the training at NTC remains focused on helping the unit see its strengths and weaknesses and get better each day. This article focuses on the training NTC offers to engineer units.

Reception, Staging, Onward Movement, and Integration

A rotation at NTC begins with a 5-day stage of building combat power called reception, staging, onward movement, and integration (RSOI), followed by a 14-day MRE. The MRE is typically divided into a 6- to 8-day STX followed by full spectrum training for the remainder of the rotation, culminating in a brigade-level operation. The engineer units that train here continue to remain as flexible and adaptive as ever, whether conducting route clearance operations, constructing entry control points (ECPs), or supporting maneuver forces for an out-of-sector mission. Engineers continue to be at the tip of the spear in both lethal and nonlethal missions.

The RSOI process continues to evolve and change with an ever more robust schedule of training events and equipment distribution for the rotational unit. The engineer units that come to NTC find this is a time of fast-paced training with new equipment drawn from the Army Center of Excellence (ACOE). The equipment listing from ACOE is not all-encompassing and continues to evolve as NTC receives new equipment that not only enhances training but also helps improve a unit's combat readiness. Now engineer units must balance the prerequisites of rail download operations, Multiple Integrated Laser Engagement System (MILES) installation, negotiations training, and vehicle and equipment preparation while simultaneously training on the aforementioned list of equipment. ACOE training includes many different focuses: robotics, route clearance equipment such as the Buffalo and Husky, and tools such as the Biometric Automated Toolset and Handheld Interagency Identity Detection Equipment. Training on intelligence-gathering equipment for intelligence section personnel will assist them in the fight against

An engineer element conducts route clearance operations.

improvised explosive devices (IEDs). After 5 days, RSOI training transitions to a combined arms operation with a tactical road march into "The Box" and the occupation of forward operating bases (FOBs) to begin conducting company-level STX lanes and the battalion/brigade relief in place (RIP)/transfer of authority (TOA) process.

Situational Training Exercises

The STX lane training at NTC drills down to the Soldier and company team levels. A full rotation of STX lane training is executed throughout NTC with a specified level of enemy personnel, civilians on the battlefield (to include Iraqi-American role players), and real-time after-action review (AAR) capability for the most realistic training available. Possible STX missions include the following:

- Area clearance
- Route clearance
- Mounted combat patrol
- Dismounted combat patrol
- FOB/ECP security
- Medical trauma
- COIN classes
- Personnel recovery

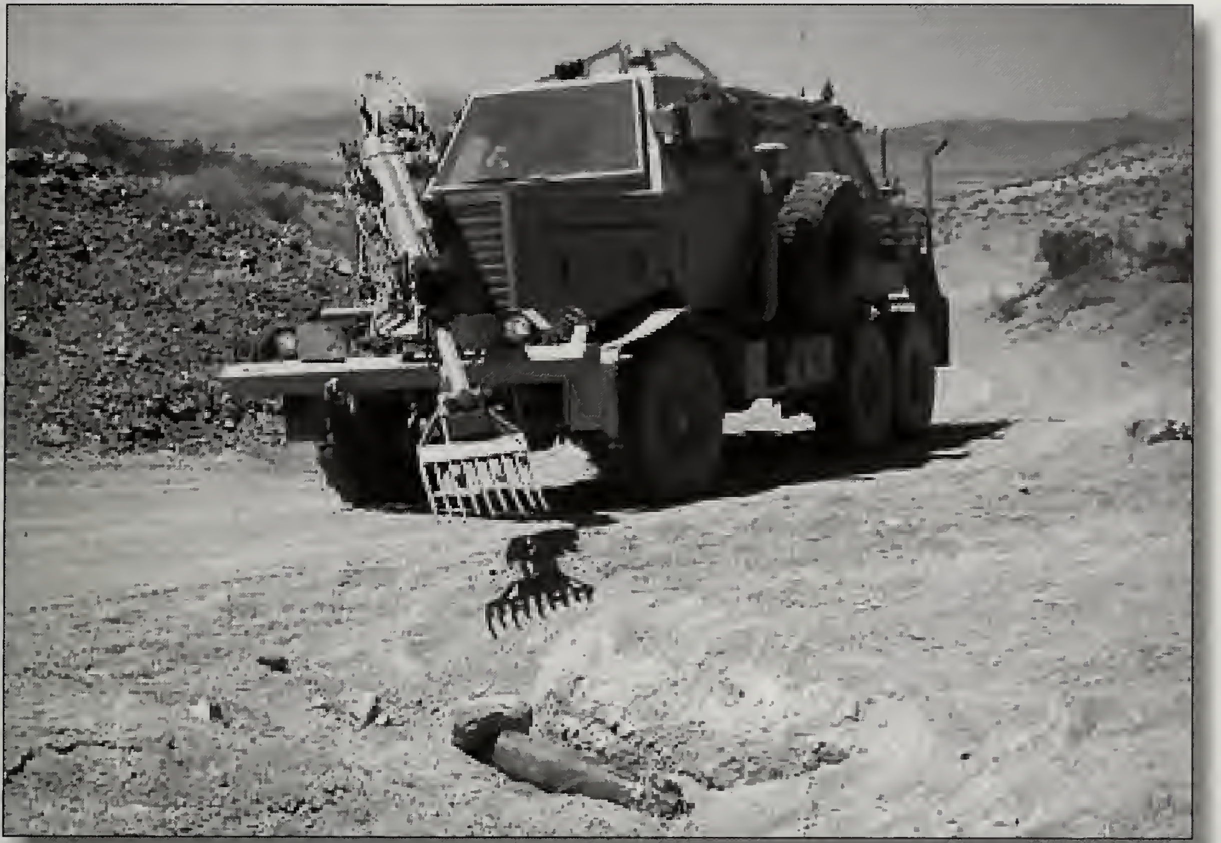
STX lanes focus on collective training based on the individual Soldier skill sets gained during RSOI. Each lane is executed using an observer/controller script that is standard throughout the operations group. Battalions and companies can tailor lane specifics to meet their training objectives. STX lanes execution is normally conducted at the platoon level for route clearance and FOB/ECP security, and at the company level when conducting mounted and dismounted combat patrol. Additionally, units can request lanes that are tailored to other training if they request it at least 90 days out. Feedback on the STX lanes is immediate, with AARs after every iteration. Units can retrain multiple times on a lane if leaders want to increase readiness or train on different TTP related to the lane.

> *"Engineers continue to be at the tip of the spear in both lethal and nonlethal missions."*

Live-fire training such as convoy operations, urban operations, and air-ground integration can also be conducted during STX lane training when coordinated through the higher unit headquarters of the brigade conducting the rotation. Soldiers and crews must be qualified on their individual weapons or must have conducted crew qualification to standard to participate in live-fire training. Engineer units have also conducted live demolitions training at NTC, to include dynamic breaching charges in the urban environment.

Full Spectrum Operations

Full spectrum operations begin after the RIP/TOA has been conducted and the rotational unit assumes control of the battlefield. Full spectrum missions for engineer units may include route clearance/sanitation, counter-IED working group, and division-directed construction or



A Buffalo mine-protected vehicle interrogates an IED.

improvement operations at FOBs, ECPs, combat outposts, or joint coordination centers. The counter-IED fight encompasses a significant amount of the full spectrum operations effort as engineers work in conjunction with the land-owning unit. Route clearance operations training teaches units to incorporate route clearance team efforts with the intelligence, surveillance, and reconnaissance planning of the maneuver unit and the historical pattern analysis of IED attacks within the area of operations. The counter-IED fight incorporates all elements—to include battalion and brigade staff integration—as well as the planning, preparation, and subsequent execution of the patrol matrices.

The IEDs replicated at NTC represent the latest emerging threats of anti-Iraqi forces from the Iraq and Afghanistan theaters. Units are continually challenged by a well-rehearsed enemy in a realistic environment.

NTC continues to give the rotational unit as many TTP as possible to "add to their kit bag," and while not all may pertain to the unit's assigned area of responsibility in-theater, they nevertheless increase the knowledge base of the Soldiers and the unit. Also, Soldiers are encouraged to use skills gleaned from United States Army schools as part of their training.

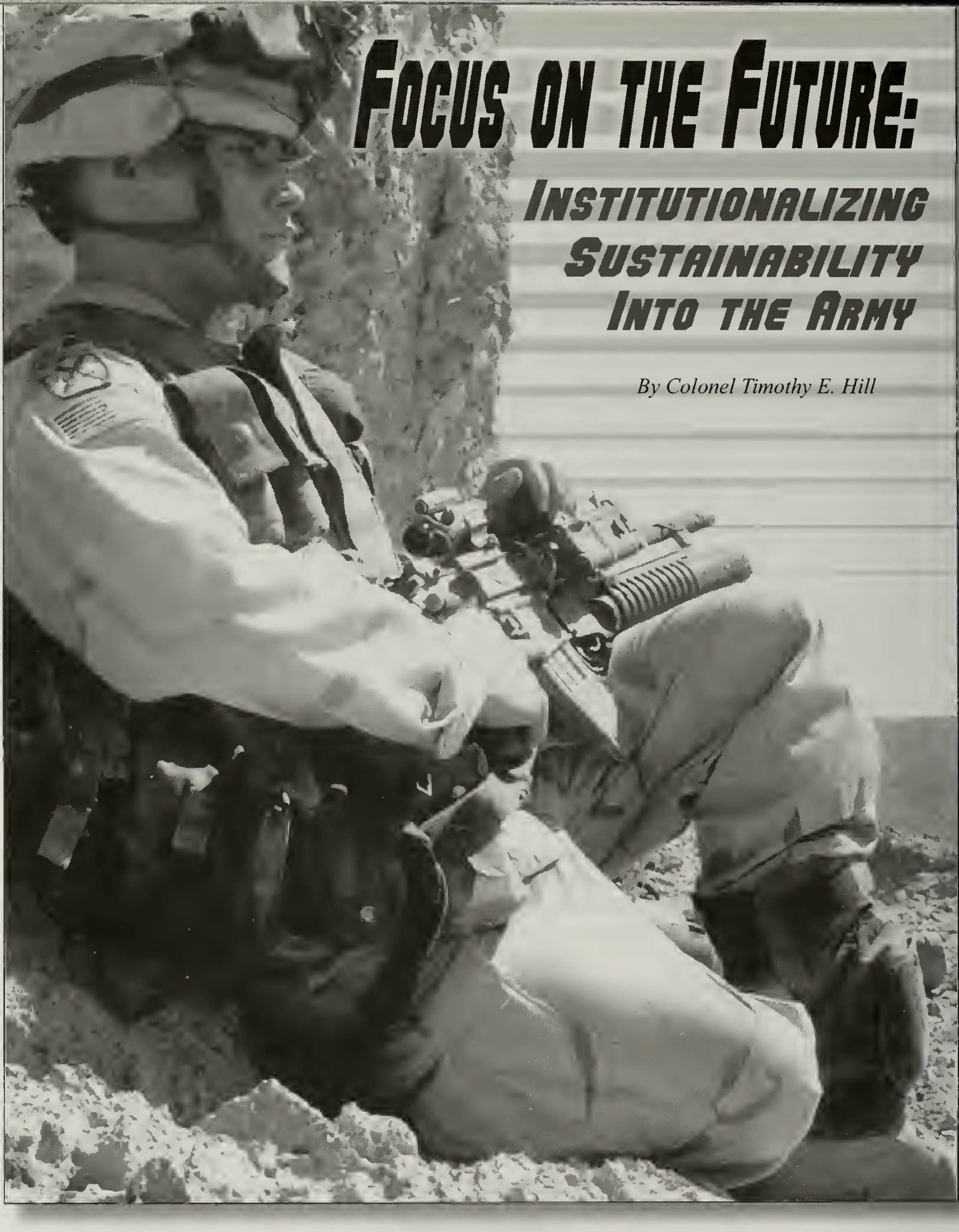
Conclusion

NTC continues to offer engineer units the same world-class training that it has since its inception in 1982. The War on Terrorism and the rapidly changing pace of the United States Army mandates the need for the combat training centers to design and conduct training as current as the fight in-theater. Training at NTC will continue to reflect the need for intensely focused, mission-specific training for this fight, and provide the Army's Soldiers and leaders with the best training in the world.

Major Lyle is an observer/controller with the Sidewinder Team, Operations Group, at NTC. He is the assistant division engineer for the Operations Group and has previously served as a battalion task force engineer trainer, senior engineer company primary, senior armor company primary, and senior infantry company primary on the light infantry task force team (Tarantula) while assigned to NTC.

SIDEWINDERS

Maneuver Support Trainers



Focus on the Future:

Institutionalizing Sustainability Into the Army

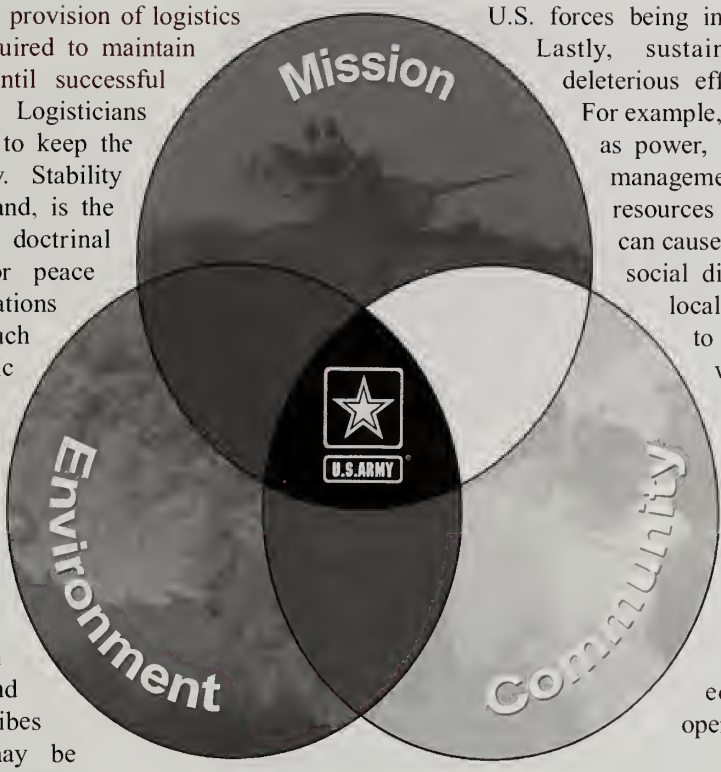
By Colonel Timothy E. Hill

One hundred years from now, when the Army's senior leaders reflect on how well the Army of 2008 coped with its challenges across the globe, will they conclude that the Army succeeded by adopting a strategic vision that included sustainable development?[1] The answer should be in the affirmative.

Sustainable development owes its understanding to the concept of sustainability, which is defined as meeting present needs without compromising the ability of future generations to meet their own needs.[2] In other words, it means not squandering, depleting, or abusing the earth and its resources, but enhancing, enriching, and preserving them.[3] An Army that focuses on sustainability is an institution that seeks to maintain its organizational vitality and recognizes and values its stewardship responsibilities. Thus, institutionalizing sustainability through education and making it an integral feature of military operations will not only facilitate its introduction into Army culture but makes eminent sense for mission success as well.

Defining Sustainability

The term *sustainability* can be confusing to some in the Army because it sounds similar to other frequently used Army terms such as *sustainment* or



stability. Sustainment is the provision of logistics and personnel services required to maintain and prolong operations until successful mission accomplishment.[4] Logisticians discuss sustainment issues to keep the force supplied and ready. Stability operations, on the other hand, is the Army's all-encompassing doctrinal term for peacekeeping or peace enforcement. Stability operations are related to missions such as humanitarian and civic assistance, counterterrorism, counterinsurgency, and counterdrug efforts.[5] The Department of Defense defines stability operations as the military and civilian activities conducted across the spectrum from peace to conflict in order to establish or maintain order in states and regions.[6] This term describes where military forces may be employed to restore order and stability within a state or region where competent civil authority has ceased to function. These forces may also be called upon to assist in the maintenance of order and stability in areas where they are threatened, where the loss of order and stability threatens international stability, or where human rights are endangered.[7] Sustainment and stability operations produce results in the short-term while sustainability, in contrast, requires future thinking and a systems approach to provide long-term strategies and solutions for current and future challenges.

The Army defines sustainability as a comprehensive systems approach to planning and decision-making designed to sustain the natural infrastructure, which includes the land, water, air, and energy resources required to conduct our mission.[8] The Army Strategy for the Environment notes that sustainability benefits from the interrelationships of the triple bottom line of mission, environment, and community.[9] Yet, sustainability has other salutary features.

Sustainability, for example, expands the traditional military concept of stability[10] by requiring planners and operators to consider societal and environmental factors[11] during stability operations. Sustainability also can enhance military operations through base operations by providing more flexibility, reducing the logistics tail, and providing greater freedom for independent action for U.S. forces.[12] Additionally, reducing the logistics tail can reduce reliance on contractors by eliminating demands on the local infrastructure and environment. In overseas operations, reducing the number of contractors and logistics requirements reduces overall operational security requirements, thereby lessening costs and the likelihood of U.S. forces being injured, killed, or kidnapped. Lastly, sustainability addresses other deleterious effects of military operations. For example, drawing utility services such as power, water, sanitation, and waste management; labor; materials; or other resources from the local environment can cause resource shortages, inflation, social dislocation, and disruption of local economies.[13] Thus, attention to sustainability is the means by which the Army can enhance its capabilities in several mission dimensions—facilities management, combat operations, and nation building. So how does the Army get there? There are numerous paths, but one area to consider is education in both the formal education system and the operational environment.

Educating the Force

Educating the force can originate in the Army education system, but this is not the only place a Soldier will learn about sustainability. For example, the use of operations orders can help a Soldier learn about sustainability by the tasks the commander implies or specifies within the mission. The application of the officer evaluation report (OER) system is another method to enhance learning about sustainability, because the Soldier will be evaluated on the task. Soldiers can also learn about sustainability through the conservation and recycling practices of the garrison installation.

Nonetheless, institutionalizing sustainability into the Army is the first step to producing a culture that embraces sustainability practices, but this cannot be attained unless changes in strategy and doctrine are examined. "As the Army transforms to a future force with new systems, organizational structures, and new doctrine to achieve full-spectrum operational capability, our training enablers and infrastructure, along with realistic and relevant training venues, must continue to be readily available to match the timelines we have established to field the future force—one comprised of highly trained Soldiers poised to fight new and different kinds of conflicts while maintaining traditional warfighting skills."[14] This statement represents a rallying cry for the Army to address sustainability as a way forward. Training, training venues, and infrastructure changes are but a piece of how sustainability can be managed within the framework of education.

Institutionalizing sustainability into the Army requires the efforts of the Army Training and Doctrine Command

Cover of The Army Strategy for the Environment

(TRADOC). TRADOC states that it is the architect of the Army and that it "thinks for the Army" to meet the demands of a nation at war while simultaneously anticipating solutions to the challenges of tomorrow.[15] TRADOC can integrate sustainability education throughout its Noncommissioned Officer Education System and its Officer Education System. The curricula associated with these systems would introduce sustainability through maintenance training programs, weapons systems training, and training environments that simulate combat conditions to instruct students how to use sustainability practices within base camps. The school environment itself could help teach sustainability practices. As an example, the United States Army Engineer School can educate its students in sustainability by teaching them how best to use the land and natural resources where operations and training occur, thereby minimizing damage to the environment while protecting the land and its resources for the future. Another potential mode is to use training scenarios that include societal and environmental drivers and variables, such as the impact of prolonged regional drought on social stability and well-being, the possible destabilization of society through human migration, and the preventive measures that could forestall adverse results.

Sustainability could be institutionalized the way risk management was institutionalized into the Army. Risk management was introduced as a safety program to reduce the number of accidents that Soldiers experienced during training and military operations. It accomplished this aim by helping Soldiers understand how an accident could occur and instructing them on ways to minimize the probability of an accident or prevent it altogether. Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk costs with mission benefits.[16] Army leaders integrate risk management into their mission planning to anticipate safety hazards, establish preventive control measures, and require annual training.

Education on sustainability can be included in mission planning for both training and operations, as was the case for risk management. Commanders at every level can introduce sustainability considerations into their planning process to mitigate potential hazards, minimize destruction to the land and other natural resources, and reduce risks to animal and human life. Also, a specific annex can be incorporated into the operations order to implement and enforce sustainability measures. As commanders prepare their operations orders, they would use the sustainability annex to help subordinates prepare individual solutions for sustainability, based on their situations.

Another way to educate the force is through the after-action review (AAR) process. The AAR can incorporate sustainability lessons learned from the event so that the participants can learn the positive and negative effects of the operation on the environment. Identifying these effects allows commanders to determine how to change their standing operating procedures to incorporate sustainability practices into future operations.

Another avenue to educating the force regarding sustainability is by addressing it in the OER system. The evaluation requires that the commander conduct face-to-face counseling with subordinate officers as a way to monitor the subordinates' performance. If sustainability is included as a feature of the OER, this will force change within the ranks. At a minimum, the officers and their subordinates will learn about sustainability and figure out ways that produce results. The OER system is an excellent tool for commanders to document innovative ideas that subordinates develop on sustainability. Once the ideas begin to emerge and flow up the chain of command, sustainability practices will be more than just an idea and will be truly instilled into the Army culture.

Conclusion

The Army is transforming its formations to address current and future national security obligations. As the Army transforms, it should educate its Soldiers to incorporate sustainability practices and concepts to fulfill those obligations without undermining the environment or causing unnecessary harm to the societies it is charged to safeguard. Instilling sustainability into Army culture will require constant training, incorporating sustainability practices and concepts into—

- The Army School System.
- Mission training environments.
- Installations, through development of sustainable training areas and resident programs.
- OER system.

Taking such steps will instill the processes needed to educate Soldiers about their responsibility for sustainability. Further, promoting this training will help Soldiers in the future because the demands on them will be even greater as climate change, human migration, and burdens on dwindling natural resources forecast future regional conflict in places where the Army will be deployed to protect our national interests. Thus, Soldiers who are aware of these future demands, conscious of the critical nature of sustainability, and educated to take a systems approach to problem solving will "sustain the mission and secure the future" for the United States Army.[17]

Colonel Hill joined the United States Marine Corps in 1977 and served as an automotive mechanic until 1982, when he joined the Marine Corps Reserves. In 1984 he joined the West Virginia Army National Guard, went to officer candidate school, and received a commission. His experience includes assignments with the Engineer and Military Police Branches. He served in Operation Iraqi Freedom as base defense commander and provost marshal for Camp Anaconda in Balad. In 2005, Colonel Hill was provost marshal during Operation Katrina after Hurricanes Katrina and Rita devastated Louisiana and Mississippi. He is a graduate of the Command and General Staff Officers Course, Combined Arms and Services Staff School, Military Police Officer Advanced Course, and the Engineer Officer Basic and Advanced Courses. He holds a bachelor's in military leadership from the University of Charleston and a master's in adult and technical education from Marshall University. He is a graduate of the Army War College and serves with the West Virginia Army National Guard as Commander, 197th Regiment (Regional Training Institute), Camp Dawson, West Virginia.

Endnotes

[1] "President's Council on Sustainable Development: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century, May 1999," *<http://clinton4.nara.gov/PCSD/Publications/index.html,>* accessed 12 December 2007.

[2] Report on the Brundtland Commission, "Our Common Future," published by Oxford University Press, 1987.

[3] Manette Messenger, "So What IS this Thing called Sustainability?" Background paper for the Department of Defense Southeast Regional Planning and Sustainability Workshop, March 2007.

[4] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, page 526, *<http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf>*, accessed 26 December 2007.

[5] Nina M. Serafino, "Peacekeeping and Related Stability Operations: Issues of U.S. Military Involvement," Congressional Research Service-3.

[6] Department of Defense Directive 3000.05, "Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations," 28 November 2005, *<http://www.dtic.mil/whs/directives/corres/pdf/300005p.pdf>*, accessed 21 December 2007.

[7] James T. Quinlivan, "Force Requirements in Stability Operations," *Parameters*, Winter 1995, pp. 59-69.

[8] United States Army Posture Statement, "Addendum K, Army Sustainability Strategy," *<http://www.army.mil/aps/07/addendum_print/k.html>*, accessed 5 September 2007.

[9] The Army Strategy for the Environment, "Sustain the Mission, Secure the Future," 1 October 2004, *<http://www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf>*, accessed 10 September 2007.

[10] CRS Issue Brief for Congress, "Peacekeeping and Related Stability Operations: Issues of U.S. Military Involvement," 18 May 2006, *http://www.fas.org/sgp/crs/natsec/IB94040.pdf>*, accessed 11 October 2007.

[11] United States Army Posture Statement, "Addendum K, Army Sustainability Strategy," *<http://www.army.mil/aps/07/addendum_print/k.html>*, accessed 5 September 2007.

[12] Kurt J. Kinnevan, Chief, Directorate of Environmental Integration, United States Army Engineer School, e-mail message to author, 20 November 2007.

[13] Kurt J. Kinnevan, telephone interview by author, 20 November 2007.

[14] Army Public Affairs, "Army Announces Comprehensive Strategy," *<http://www.sustainability.army.mil/function/training_readiness.cfm>*, accessed 10 September 2007.

[15] Training and Doctrine Commanding General Vision Statement, *<http://www.tradoc.army.mil/about.htm,>* 15 October 2007.

[16] Field Manual 100-14, *Risk Management*, 23 April 1998.

[17] United States Army Posture Statement, "Addendum K, Army Sustainability Strategy," *<http://www.army.mil/aps/07/addendum_print/k.html>*, accessed 5 September 2007.

This article is reprinted from the Summer 2008 issue of *Maneuver Support Magazine*.

WILDFIRE MAPS AID FEMA MISSION

By Dr. JoAnne Castagna

Photo courtesy of FEMA Joint Field Office

In October 2007, a series of wildfires began burning across Southern California, leaving death and destruction in their path. Twenty raging brush fires were fanned by strong winds that quickly spread to seven counties. At least 1,500 homes were destroyed, leaving thousands homeless, and more than 500,000 acres of land burned from Santa Barbara County to the United States–Mexico border. Nine people died as a direct result of the fire; 85 others were injured, including at least 61 firefighters. More than 6,000 firefighters fought the blazes, aided by United States Army units, almost 3,000 prisoners convicted of nonviolent crimes, and 60 firefighters from the Mexican cities of Tijuana and Tecate. Major contributing factors to the extreme fire conditions were drought, hot weather, and unusually strong Santa Ana winds with gusts reaching 85 miles per hour. The fires had numerous sources.

A precise method to help locate and assist displaced people was needed. In response, the Federal Emergency Management Agency (FEMA) sought the expertise and capability of the United States Army Corps of Engineers Geographic Information System (GIS). The Corps had used its GIS expertise on several past missions, including during response to Hurricane Katrina and 9/11 at the World Trade Center. In California, the GIS maps helped FEMA identify the affected areas in the scorched counties and locate displaced people requiring assistance. The maps will also help to protect the state from potential safety hazards that can result from wildfires in the future.

The GIS is a computer-based information system and tool for analyzing spatial data. It takes information from various sources, such as aerial photographs (pre- and postevent), drawings, satellite imagery, commercial data sources, and vector data from field sources such as fire perimeters, ignition points, and burn intensity data, and combines these layers of information in various ways as overlays to perform spatial analysis and produce an electronic map that depicts the results of that analysis.

There are several types of GIS maps:

- County and damaged structure maps
- FEMA individual assistance application maps
- Demographic maps
- Flood plain maps
- Soil burn severity maps

County and damaged structure maps identify counties adversely affected and damaged homes and businesses. The information shows FEMA where to set up Disaster Recovery Centers (DRCs) to enable residents to obtain FEMA assistance applications. Maps of the DRC locations were also created to direct the public to the nearest DRC. When FEMA receives assistance applications from residents, they contact them to verify the location of their damaged structure. FEMA then uses the Corps's GIS maps to verify that the county they live in was badly burned and that structures were damaged.

FEMA individual assistance application maps are used to locate where clusters of residents are submitting applications

An area of southern California engulfed in flames from wildfires that made their way across the region last fall.

Photo courtesy of FEMA Joint Field Office

for FEMA assistance, where damage may have occurred, and where a DRC may need to be set up.

Demographic maps locate where economically challenged individuals live who don't have transportation to get to the nearest DRC. Once identified, FEMA sends a mobile DRC to the area.

Flood plain maps identify areas that border rivers that are prone to flooding. In order for FEMA to set up temporary trailer parks for residents, it needs to know where flood plains are located in order to avoid those areas.

Soil burn severity maps show where the wildfires burned the most and where there is the most soil erosion. This is important for FEMA to know because when fire "cooks" the soil, it eventually breaks it up, leaving chunks of soil that are like pottery. When the rainy season comes, these large pieces of hard earth can cause mud slides on hills, injuring people and damaging property.

These GIS maps are also being used by groups other than FEMA. For example, the Environmental Protection Agency looked at the burned areas to see what environmental impacts had occurred, and emergency responders used them to identify where they needed to evacuate people. The geospatial information and data products provide disaster emergency managers and responders at all levels of government with information to help them make more informed decisions, ultimately reducing the risk to life, property, and the environment.

An area of southern California that was badly burned by devastating wildfires.

Photo courtesy of Chad Markin, USACE, Rock Island District

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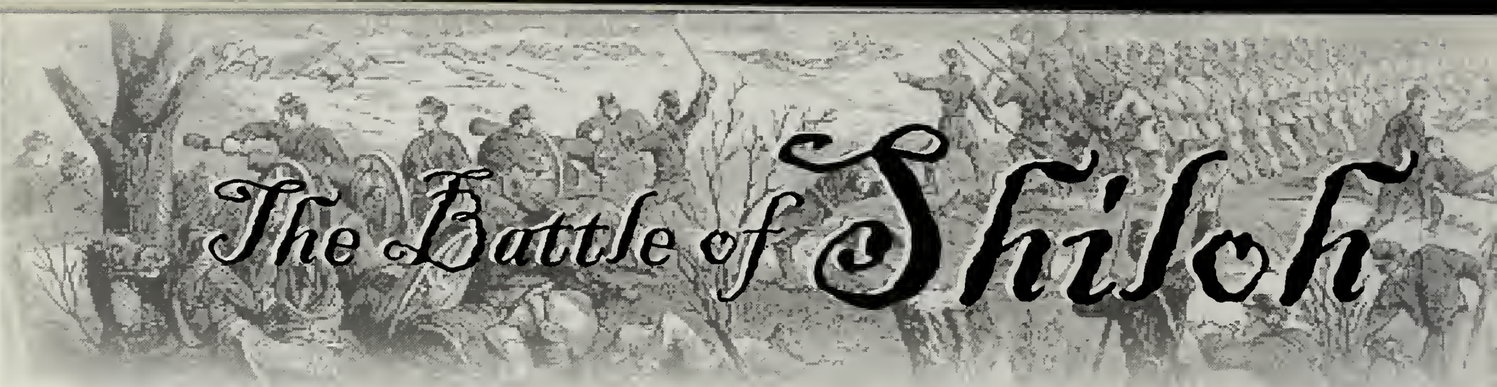


The Battle of Shiloh

By Captain John T. Shelton

Each session of the Engineer Captain's Career Course (ECCC) is required to write an article analyzing a historical battle, and the best overall professional article receives the Thomas Jefferson Writing Excellence Award. This article was judged the best article of ECCC 1-08.

The two-day Battle of Shiloh was fought between the Union and the Confederacy on Sunday and Monday, 6 and 7 April 1862. On the first day, the Union force was composed of the Army of the Tennessee, commanded by Major General Ulysses S. Grant. On the second day, the Army of the Ohio, commanded by Major General Don Carlos Buell,[1] joined Grant's force. Most of the roughly 45,000 Union troops were from Regular Army units and included 19 infantry regiments, 5 artillery regiments, and 6 cavalry regiments.[2] The Confederate Army of Mississippi, under General Albert Sidney Johnston and General P.G.T. Beauregard, consisted of 4 corps, 16 artillery regiments, and 6 cavalry regiments. There were also 10 legions, or combined arms teams,[3] for a total of about 40,000 Confederate troops.[4] Few of the Confederate Soldiers were as well equipped or battle-tested as their opponents.

Major General Ulysses S. Grant

Major General Don Carlos Buell

Although the battle was fought over a two-day period, the focus of this article is on the second day, between 0700 and 1600. The Union forces that day consisted of the remnants of Grant's force from the previous day plus late-arriving reinforcements led by Buell and Major General Lew Wallace, which brought Union totals back to about 45,000 troops. Beauregard, who took command of the Confederate side when Johnston died during the first day's fighting, had only the remnants of his force from the day before, totaling less than 30,000 troops.[5]

Analyzing Day Two

There is no dispute that the Army of the Tennessee under Grant won the Battle of Shiloh. However, through the lens of modern doctrine and tactics, the events of the battle can be scrutinized and analyzed. Most of the decisions made by Grant and Beauregard are clearly supported by current United States Army doctrine and show both good and bad examples of how to apply its concepts.

Current doctrine supports Grant's offensive tactics, although he not did plan properly to exploit his success and thus allowed the Army of Mississippi to escape. The battle on 7 April can be divided into three distinct phases:

- Phase I: Grant transitions to the offense
- Phase II: Beauregard retrogrades to Shiloh Church
- Phase III: Beauregard orders a retreat

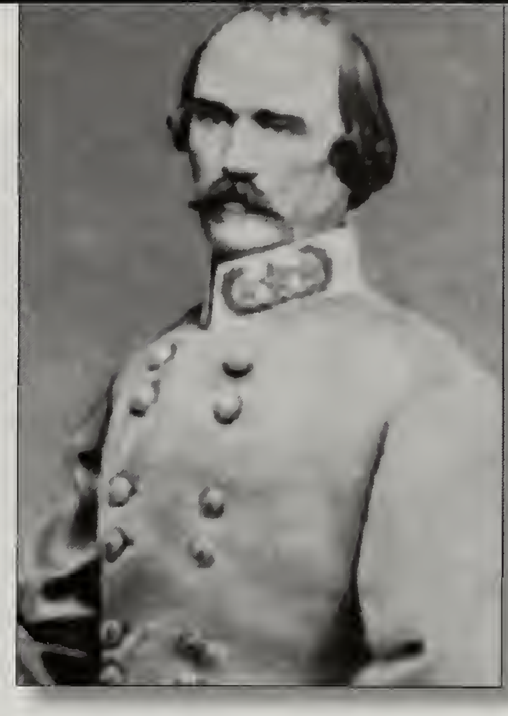
This article will address the current Army doctrine that applies to the actions—resulting in positive and negative outcomes—taken by both sides during these three phases. It also will analyze the implementation of the doctrine.

Phase I

After the fierce fighting on 6 April, both the Union and Confederate Armies needed resupplies of men, food, water, ammunition, and artillery.[6] The Union received reinforcements in the early morning of 7 April, and this marked the beginning of Phase I. The Army of Mississippi did not receive reinforcements, and many of the Confederate forces had no command and control higher than the company or platoon level. Grant saw this as an opportunity to retake ground lost the day before and transition into an offense. Beauregard was not aware of Grant's reinforcements and resupply and so did not act fast enough to reconsolidate his command and control. Beauregard still believed he was fighting an offensive battle against Grant. This lack of knowledge allowed Grant to seize, almost unopposed, two landmarks—the Hornet's Nest and Peach Orchard—that had been hotly contested the previous day.

Doctrine states that the purpose of defensive operations is to "buy time, economize forces, or develop conditions favorable to offensive operations."[8] Grant made this transition from a defensive to an offensive posture flawlessly. He used tactical patience to wait until the conditions were favorable to seize terrain that his forces had lost the day before. His scouts informed him that the Confederates were unable to mass any effects to slow his advance. Grant understood the purpose of the offense (which is to defeat the enemy), evaluated the best way to apply the characteristics of the offense,[9] and used every one of them to secure his success:

- *Surprise.* Grant used surprise, which in this attack was the most important characteristic, to keep the enemy from knowing he had gained additional men and supplies and launched a frontal assault against unprepared and under-equipped Confederate forces. Surprise allowed him to seize terrain he had lost on 6 April and to do so with little resistance.
- *Concentration.* Grant concentrated his forces and set the conditions to have a much larger force than the Confederates.
- *Tempo.* Grant synchronized the tempo of his forces to allow all subordinate commanders to attack at the same time and at a set speed in order to mass his effects.

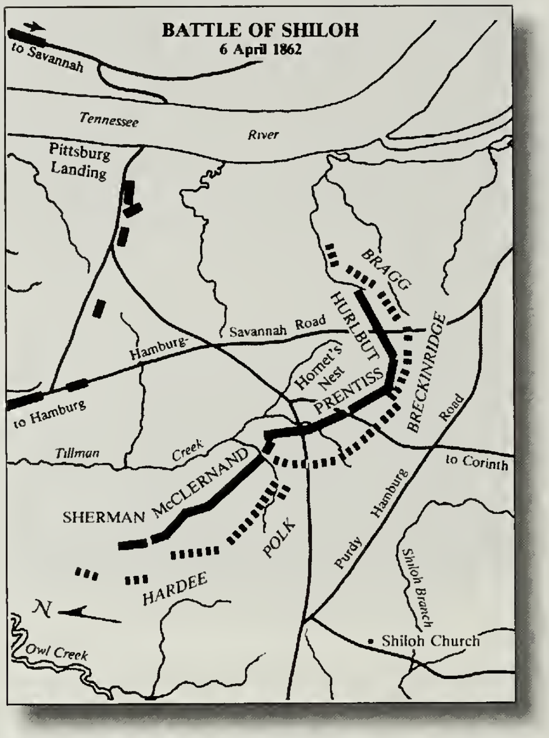


General Albert Sydney Johnston

- *Audacity.* Grant used audacity "to execute violently and without hesitation," rendering any Confederate resistance futile since they could not apply the elements of the defense or consolidate their command.[10]

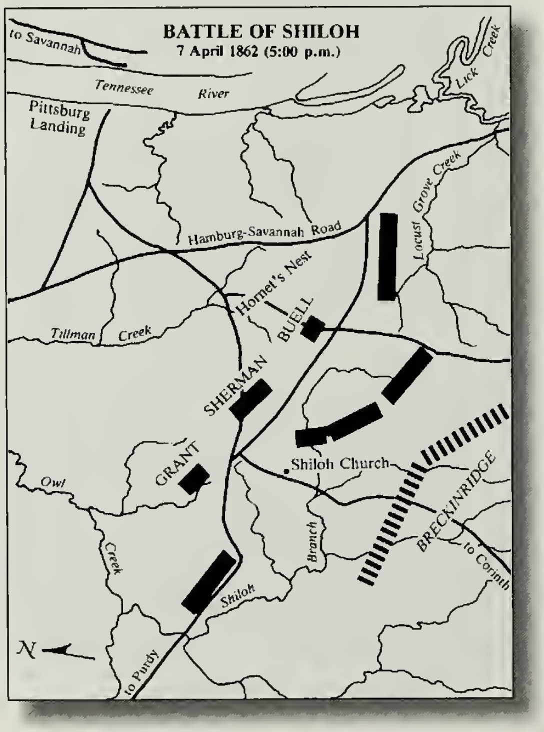
During Phase I, the Army of the Tennessee executed a perfect transition from the defense to the offense. This fact is clearly supported by Grant's use of the characteristics of the offense and his understanding of the purpose of the defense. Further, Grant's choice of a frontal assault, usually the least-preferred method of attack, produced a decisive result. Beauregard was unaware of the success of Grant's attack, illustrating Grant's successful use of surprise. Grant's effective

General P.G.T. Beauregard



use of his reconnaissance elements let him understand how and when to exploit Confederate weaknesses. Beauregard's lack of command and control and his inability to use his reconnaissance assets to get situational awareness caused his forces to fail in Phase I.

The tactical lesson here is to always have situational awareness as a commander and always use reconnaissance assets. Beauregard demonstrated that operating on an outdated and inaccurate common operating picture can have catastrophic results. His reconnaissance assets could have let him know that the Union forces had been resupplied and repositioned. However, since he didn't know this, Beauregard thought he had plenty of time to reconsolidate his forces and even believed he was still on the offensive. This lesson directly affected everything that happened during the rest of the battle.



Phase II

Beauregard started receiving reports of Grant's success at about 1000 hours and now understood that he was conducting a failed defense. Further, his commanders were following orders that were 24 hours old and no longer applied to what was happening on the battlefield. Beauregard needed to coordinate his actions and prepare a defense. Confederate scouts reported that Grant had split his forces into three elements, each advancing independently but well synchronized. Beauregard analyzed the terrain that he still held and saw an advantage at Water Oak Pond, a hotly contested water feature on the battlefield. He decided to reconsolidate his forces and used some of them to stall Grant's advances and ordered the rest to retrograde to Shiloh Church. This plan succeeded in disrupting the tempo of Grant's advance.

Beauregard used his knowledge of the defense to buy time, economize his forces, and set up conditions to resume offensive operations. His plan was to—

- Retain decisive terrain, which in Beauregard's mind was forward of Shiloh Church and up to Water Oak Pond. This terrain left him a sizable footprint on the Shiloh battlefield.
- Fix Grant's forces using Water Oak Pond and nearby swamps. This would slow the tempo of the Union forces and perhaps desynchronize their efforts.
- Concentrate Grant's forces by getting him to commit his left flank at Water Oak Pond.

The Army of Mississippi executed defensive principles well, but Beauregard's plan failed in its use of surprise. Grant knew where Beauregard put his forces and understood what the Confederate forces were being used for. Grant could clearly see that Beauregard was trying to execute a retrograde, "a type of defensive operation that involves organized movement away from the enemy."[11] Grant believed he had forced Beauregard to initiate this action, but Beauregard believed he had done this on his own accord, so his confidence in his plan was still intact. Grant recognized the Confederate force as a rear guard, so he acted accordingly to reestablish the Union tempo. Beauregard thought he had slowed the Union force enough to accomplish his reorganization. The biggest problem Beauregard had in his plan to retrograde to Shiloh Church was in the determination of the Confederate main battle area. His forces did not concentrate their efforts enough to slow Union advances to buy the time needed.

The tactical lesson here is that communications make or break an operation. This lesson came from the Confederate Army's inability to employ all the aspects of a defense and its failed attempt to use a retrograde movement as the means to regain the offensive. Beauregard understood how to execute the retrograde and his plan was solid, but his lack of coordination with subordinate units cost him the ability to use the retrograde properly. Beauregard's intent changed from a retrograde as a way to reestablish an offense to a retrograde as a way to withdraw. Because his intent changed in the middle of the battle, his forces were slow to react to his new plan. Beauregard knew how to do a lot of things well; he just did not do enough to regain the initiative and transition back to an offense.

Phase III

Reports continued that Grant's push was extremely successful, and Beauregard was shocked that his common operating picture was not accurate—again. However, Beauregard's scouts reported that Grant's men would not be able to pursue because Grant had stretched his lines too thin to maintain his tempo.[12] Once again, Beauregard analyzed his position and decided his best option to retain combat power was to withdraw from Shiloh. This effort would be a lot easier to coordinate since the Confederate communication lines were no longer stretched out, and what was left of his force was in the vicinity of Shiloh Church. Further, the Army of Mississippi's remaining artillery could cover the withdrawal. Beauregard positioned his rear guard in plain sight of the Union Army and began his withdrawal from Shiloh. Grant recognized what the enemy was doing and knew that by letting them retire from the field he had met his intent. The Union Army made no effort to pursue Beauregard's withdrawal and set up camp in the area around Shiloh Church. This ended the Battle of Shiloh.

Today's doctrine supports both Beauregard's and Grant's decisions in Phase III. However, neither the Confederate nor the Union leader executed their plan well. Beauregard's plan never put him in a position to destroy the enemy's ability to synchronize or stall his will to fight.[13] As before, Beauregard did not have good situational awareness. It would have been better to execute the Confederate withdrawal from Shiloh at the end of Phase II, but Beauregard continued to try to retake the initiative. His execution was weak; he only minimally met the criteria for a defense and could not synchronize his efforts with his subordinate commanders. The Confederate withdrawal worked well, but this owed more to Grant's weakness than to Beauregard's plan. Beauregard used his fire support well, not so much by inflicting casualties but as an effective means to give his withdrawal support by fire. The coordination during the Confederate disengagement was strong and the only reason his rear guard was not defeated. But ultimately, Beauregard met his last intent—to preserve his combat power.

Grant's weakness in Phase III was based on stretching his supply lines too thin and exhausting his troops. If he had attached his resupply assets to his units in direct contact with the Confederates, they could have made sure those units did not run out of ammunition, and so could have continued their pursuit. Also, Grant's infantry and cavalry moved too fast to integrate the Union artillery, keeping Grant from using one of his key battle systems. Grant did not set phase lines to control his tempo in Phase III, so Union troops pursued the Confederates until they were unable to continue. Stopping pursuit when they had the Confederates on the run was a direct result of this poor planning. Grant had the opportunity to destroy the Army of Mississippi but failed to do so—not for lack of mass but for lack of planning.

The tactical lesson learned here is at the expense of the Union. Failure in the combat, service, and support fight will stall an attack just as thoroughly as defeat by an enemy force. The end result of outrunning supply lines is a halt to the battle. When the enemy is conducting a retrograde with the intent to retire, it means the enemy was not defeated. In addition, Grant did not use his combat multiplier because his artillery could not keep up with his infantry and cavalry. The artillery could have destroyed Beauregard's rear guard and laid counter-battery fire on the Confederate guns.

Summary

The history books report that Grant was satisfied with the results of the Battle of Shiloh, but failing to defeat the enemy is not acceptable in today's Army, and it was not acceptable in the Civil War.

Captain Shelton was commissioned through the Army Reserve Officer Training Corps, served with the 36th Engineer Group and the 11th Engineer Battalion at Fort Benning, Georgia. He deployed to Iraq with the 36th Engineer Group in 2005. He graduated from the Engineer Captain's Career Course in April.

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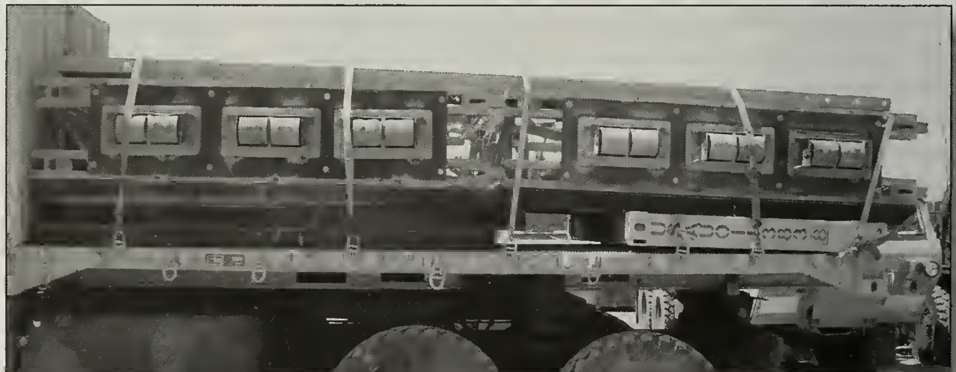
PIONEERING NONDOCTRINAL BRIDGING OPERATIONS: THE "ROLLER SKATE" REPAIR

By First Lieutenant Nicholas A. Soroka

Engineers are fundamentally problem solvers. Whether the problem is getting people to their destination or shaping the battlefield, odds are that an engineer can and will solve the problem. Engineers can usually adapt tested, doctrinal methods to fit a given situation. But sometimes tested, doctrinal methods aren't enough. As the 502d Engineer Company learned while repairing a bridge near Baghdad, when engineers can't adapt doctrine, they must pioneer it.

The problem started with erosion cutting away the bank of a river. The edges of the bank were coming closer, day by day, to the ends of the bridge. The doctrinal approach would have engineers stop the erosion of the bank or extend the length of the bridge so its ends could rest a safe distance away from the precarious edge. But halting the erosion wouldn't solve the problem in this case, because the bridge already rested dangerously close to the river's edge. And the bridge was already at its maximum safe length. The bridge company would need another solution.

The Soldiers of the 502d continued to brainstorm for a new idea, but nearly everyone reluctantly agreed that the solution was going to be difficult. Because the bridge was



The roller skate sections, fabricated from damaged bridge parts, are ready to be transported to their destination.

Soldiers unpack one roller skate section that will be used to move the bridge.

originally emplaced at an angle, removing the entire bridge and building a new one at the correct angle would solve the problem. This would require a lot of resources, close the bridge for several days, and make it difficult to resupply Soldiers in some combat outposts. While some people would have accepted this difficult plan and its corresponding risk, one noncommissioned officer devised a nondoctrinal solution that would save manpower, resources, and perhaps lives—simply rotate the bridge.

While the concept may seem elementary, rotating a 90-ton, million dollar bridge is anything but simple. Any such attempt would be nondoctrinal, unorthodox, and unprecedented. In short, the 502d needed to risk pioneering a new technique. Members from the company's maintenance platoon fabricated two pairs of enormous "roller skates" from damaged parts of older bridges. Sliding on these roller skates, both ends of the bridge could simultaneously swing into their new locations. But would the proposed solution work? While back-of-the-envelope calculations supported the design, no one could be sure without testing. Unfortunately, there wasn't enough time for testing. Even if the proposed solution were sound, dozens of other factors could easily lead to catastrophic failure.

Arriving on site, the 502d engineers quickly established security, removed the bridge's on-ramps, lifted the ends of the bridge, and attached the roller skates. Once the engineers connected the roller skates, they hooked up a system of winches to pull the bridge into its new position. Next came the moment of truth. The engineers paused and awaited the final command to start pulling. In a few short moments, the uncertainty surrounding this nondoctrinal solution would be settled. A loud "Pull" crackled over the radio, and the winches began to tighten. With an audible metallic groan, the bridge began to roll and rotated without a problem into its final position.

The plan worked. Engineers had solved the problem. Because the Soldiers of the 502d couldn't adapt old doctrine to solve a problem, they engineered a solution of their own. While some may consider this process risky, it's ultimately how new doctrine starts. By designing, implementing, and pioneering a nondoctrinal solution, the members of the 502d proved themselves worthy of the title "Engineers"—problem solvers.

First Lieutenant Soroka is a platoon leader for the 502d Engineer Company (Multirole Bridge), Hanau, Germany. He completed the Engineer Officer Basic Course in January 2007, and the Sapper Leader Course in February 2008 at Fort Leonard Wood, Missouri. He holds a bachelor's in civil engineering from the United States Military Academy at West Point, New York.

Photographs by First Lieutenant Nicholas A. Soroka.

Iron Claw Academy:

Developing Route Clearance Capabilities in the Iraqi National Police

By Captain Scott F. Swilley

Five years into Operation Iraqi Freedom, improvised explosive devices (IEDs) continue to pose a significant threat to coalition forces, Iraqi Security Forces (ISF), and the Iraqi population. The United States Army has invested a great deal of money in fielding vehicles with significantly improved survivability, and this equipment has unquestionably saved countless lives in Iraq. Nevertheless, most coalition forces adjust their patrol schedules and routes to avoid likely IED engagement areas. This is not true for the route clearance teams (RCTs) that patrol the streets of Iraq every day. These teams, affectionately known as "Iron Claw," continually patrol the neighborhoods and streets to find IEDs and keep the routes safe for travel.

While route clearance has traditionally been a primary mission for coalition forces, the development of an Iraqi route clearance capability will help the transition to tactical overwatch. Across Iraq, senior coalition force leaders are aggressively moving toward putting the ISF in the lead and developing additional ISF capabilities. An independent ISF route clearance capability would reduce Iraqi reliance on coalition forces and enable coalition force brigade combat teams (BCTs) to expand their route clearance efforts as unit boundaries shift over time or to mass coalition force route clearance teams in remaining security problem areas.

Recently, Soldiers attached to the 4th Infantry Division (Mechanized) took an important first step in building a future ISF route clearance capability. Through partnership, training, and certification, they dedicated their time and energy to creating an Iraqi RCT within an Iraqi National Police (NP) brigade. The brigade is a uniquely equipped unit that is responsible for securing a main arterial route in Baghdad.

Establishing a Partnership, Sharing a Vision

Developing a close partnership with the NP brigade was an essential step in developing the Iraqi Iron Claw team. Close coordination with the brigade's transition team opened the door for this relationship. The NP brigade commander was extremely receptive to the concept of developing the route clearance capability within his unit and training with U.S. Army engineers. The NP transition team served as an effective agent, negotiating numerous manning, equipping, training objective, and certification standards agreements with the NP brigade commander. Beginning in May 2008, Phoenix Iron Claw, the U.S. route clearance team, developed grassroots partnerships and began conducting combined patrols with the NP brigade. The NP brigade integrated armored security vehicles into Phoenix Iron Claw patrols and embedded ISF leadership in Phoenix Iron Claw command and control vehicles with a coalition force patrol leader and interpreter.

RCT Training

By June 2008, encouraged by the grassroots partnership efforts and the success of combined patrols, the NP brigade commander agreed to establish a dedicated

RCT called *Shurta*. Subsequently, the U.S. Soldiers began earnest preparations of the Phoenix ISF Iron Claw Academy. Modeled after the Task Force Iron Claw Academy used to certify coalition force RCTs upon arrival in the Iraqi theater of operations, the Phoenix ISF Iron Claw Academy trained and certified the NP brigade's RCT through a 10-day program of instruction that included individual, crew, leader, and collective training. The course outline consisted of three compounding phases: route clearance equipment training, tactics instruction, and practical exercises, plus a certification lane.

The U.S. Soldiers prepared training support materials in English and Arabic and vetted the translated training materials through several U.S. and Iraqi agencies for content, accuracy, and cultural sensitivities. The NP brigade delivered ISF vehicles a week in advance of the course start date in order to mount a mine roller and blower to the vehicles for additional counter-IED capabilities. The U.S. Soldiers certified trainers and rehearsed the use of translators for presentation of training materials.

Equipment Training

When the NP brigade route clearance platoon arrived for the first day of training, there were many familiar faces in the group from the combined patrolling and IED awareness training conducted in the preceding months. Upon arrival, the trainees moved to the local training area for three days of training on the following equipment:

- Buffalo
- Husky with ferret arm
- REVA (Reliable, Effective, Versatile, and Affordable), a South African wheeled armored vehicle

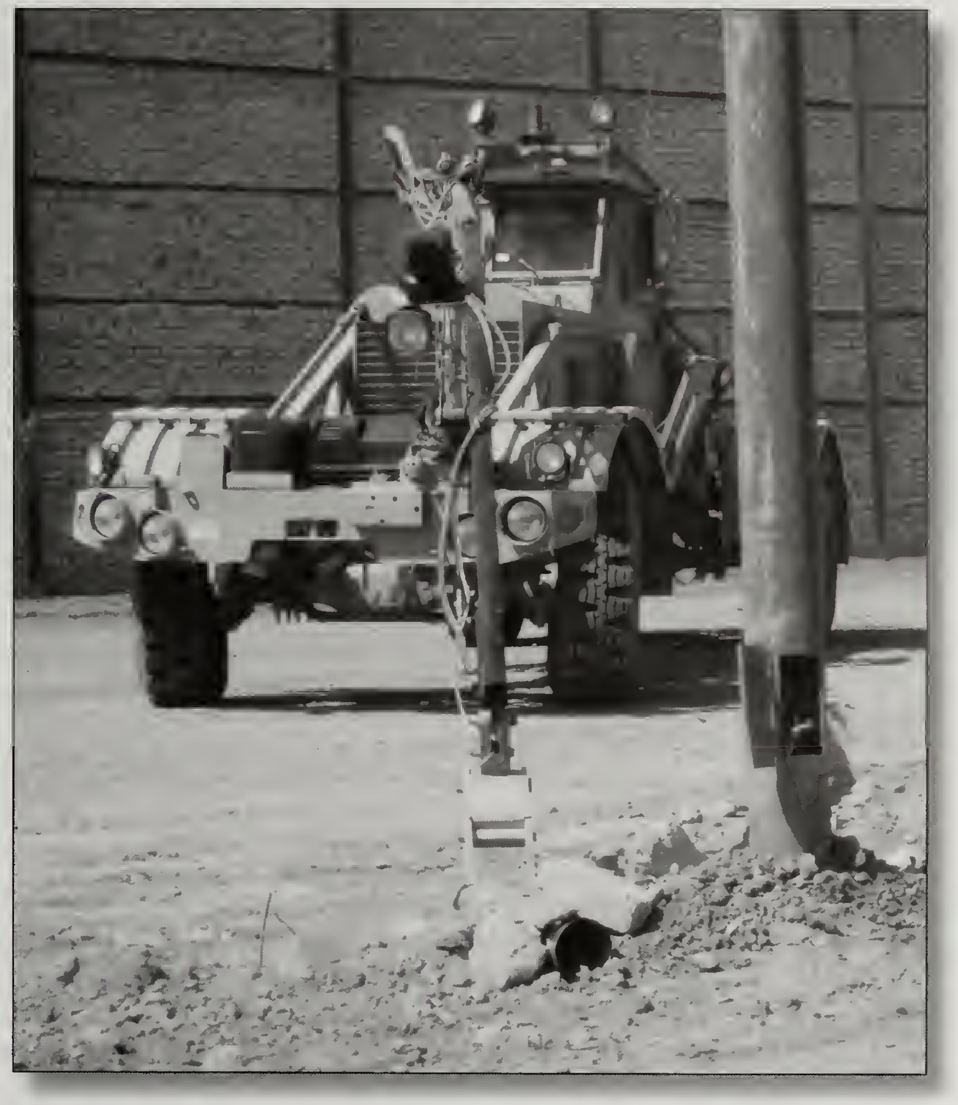
Equipment training mirrored U.S. Army standards for new equipment training, progressing from familiarization to preventive maintenance and finally to driver training. The driver's course included a ground-guiding lane, a closed half-mile course, and a serpentine course that allowed the drivers to better judge mine roller clearance and turn radius, critical skills while negotiating security checkpoints.

Tactics Instruction

As with the majority of training, the company noncommissioned officers (NCOs) took the lead and presented tactics instruction, through interpreters, to the students. To set conditions for effective practical exercises, the tactics instruction focused on the following:

- Mission preparation for a route clearance patrol
- IED indicators
- Battle drills
- Vehicle recovery
- Patrol formations

The classroom instruction also served two ulterior objectives: it provided a reprieve from 110-degree temperatures and highlighted the expertise and leadership role of United States Army NCOs. The opportunity to demonstrate the potential of the U.S. Army's NCO Corps encouraged the Iraqi RCT officers to empower their subordinates and foster initiative within the ranks. Several of the tactics classes focused on troop-leading procedures and the importance of participation by all members of the team during patrol preparation.



A Husky operator from the 1st National Police Brigade interrogates an inert IED with the ferret arm during the certification lane.

"Iron Claw teams continually patrol the neighborhoods and streets [of Iraq] to find IEDs and keep the routes safe for travel."

RCT patrol leaders reviewed material with U.S. instructors before presenting a block of instruction, so they entered the classroom with a solid understanding of tactics and a willingness to consider alternative patrolling techniques. The U.S. instructors encouraged the NP leaders to apply all available resources, most notably a mastery of the terrain and insight into enemy behaviors, to critical steps such as reconnaissance and surveillance.

Practical Exercises

The Iraqi RCT members exited the classroom eager for the opportunity to display their newfound IED defeat training. Throughout the training, they displayed marked improvement and their leaders willingly accepted advice. The practical exercises included an IED indicators lane, self-recovery of RCT vehicles, movement formations, and actions on IED battle drills.

An explosive ordnance disposal company and a weapons intelligence team supported the U.S. instructors and enhanced training during practical exercises by producing realistic training aids. Students negotiated the IED indicators lane one vehicle at a time, focusing on identifying as many indicators as possible. During the practical exercises, the Iraqi RCT leaders took over patrol preparation. The practical exercises included emphasis on deliberate rehearsals, to include the following:

- Rock drills on sand tables
- Walk-through rehearsals
- Radio rehearsals
- Mounted rehearsals
- Recovery operations exercises to reinforce the importance of precombat checks

Certification

The certification lane was the capstone event for the Phoenix ISF Iron Claw Academy. The Iraqi RCT leaders were assigned a typical main supply route clearance mission. U.S. instructors provided mock intelligence assessments with leading questions to provoke the tactical problem-solving techniques discussed during tactics instruction. The U.S. instructors evaluated the RCT patrol leader and his unit on the following:

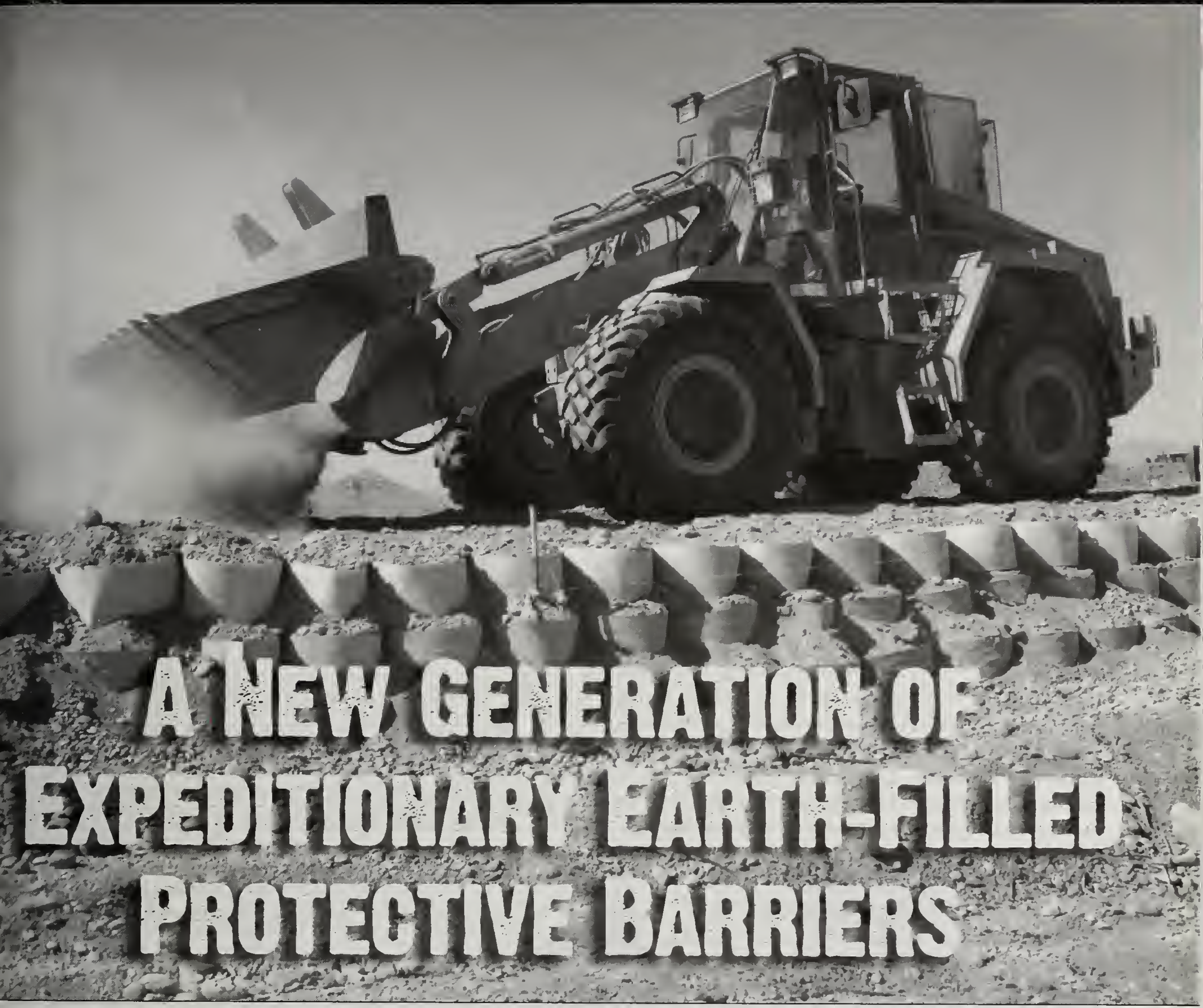
- Patrol preparation
- Use of visual aids
- Patrol briefs
- Rehearsals
- Conduct of the route clearance patrol
- Actions on contact
- Recovery
- Post-combat operations

The Iraqi RCT conducted two iterations of the certification lane. The first scenario focused on actions taken when an IED is found, while the second scenario involved a complex attack. Both iterations revealed areas that needed improvement, but overall the team met the standard for progression to combined route clearance operations.

Keys to Success

With the first cycle of Iron Claw training completed successfully, U.S. leaders identified several keys to success as takeaways to support future training and operations. Developing partnerships and obtaining Iraqi buy-in to form a dedicated RCT opens the door. Training Iraqi forces to perform the route clearance mission does not require the creation of a new training methodology; using the standard eight-step training model and the existing Phoenix Iron Claw Academy program of instruction worked well. Emphasizing patrol preparation is just as important as resourcing the RCT with special counter-IED equipment. Finally, a deliberate sustainment training plan, maintenance plan, and continued combined patrolling will enhance performance as the ISF moves forward. Transition requires willingness, patience, and training for both coalition forces and the ISF. As a result of this training, in a few short weeks Iraqi citizens will see their own security forces clearing important roads and recognize the willingness, patience, skill, and dedication of ISF and coalition forces in partnership together.

Captain Swilley has commanded Echo Company, 4th Battalion, 64th Armor Regiment, for two years as part of 4th Brigade, 3d Infantry Division. His past assignments include project manager, Division Engineers, 3d Infantry Division; operations and training (S-3) officer, 2d Battalion, 10th Infantry Regiment; training developer, United States Army Engineer School; and platoon leader, assistant S-3, and company executive officer, 16th Engineer Battalion. He holds a bachelor's from Louisiana State University and masters' in civil engineering and engineering management from the University of Missouri-Rolla (now Missouri University of Science and Technology), and is licensed as a professional engineer in Missouri.



A NEW GENERATION OF EXPEDITIONARY EARTH-FILLED PROTECTIVE BARRIERS

By Warrant Officer 2 Matt A. Graves

First there were sandbags, then came gabion baskets, and now a new element in field fortifications is emerging that could give sappers an enhanced, multifaceted capability for force protection. Since deploying to the Balkans more than 15 years ago, the Corps of Royal Engineers has become increasingly involved with the construction of static physical force protection in the form of blast walls, protective berms, *sangars* (fortified observation posts), and explosive ordnance disposal (EOD) protective works. We also continue to assist with infrastructure construction such as building roads, culverts, and flood protection measures.

DefenCell is a relatively new military innovation that will provide additional options when undertaking all of these tasks. It has been successfully used in Afghanistan by the British Army's 39 Engineer Regiment (Air Support) to construct protective berms and ground stabilization structures at several locations and at the Defence Explosive Ordnance Disposal School in Britain to improve its EOD training area. DefenCell is a geotextile polymer structure that has great strength, not just because of the textile's properties, but because of the cellular form of each unit. The cells confine the fill material and give it such load-bearing strength that it can be driven on or even compacted with heavy rollers. This in turn enhances its ballistic protection properties and aids the stability of the structures. Walls of substantial heights can be achieved by field engineers, and DefenCell engineers can help in the design of even higher structures.

Afghanistan Case Study

The 39 Engineer Regiment (Air Support) began construction of ammunition supply points (ASPs) that could securely contain large amounts of ordnance ranging from air-dropped weapons to trip flares. Among their goals, the engineers sought to—

- Eliminate the huge footprint a standard earthen berm would require.
- Reduce the logistical burden presented by a construction of this size.
- Develop a "metal-free" solution to reduce the danger of secondary fragmentation from possible explosions.

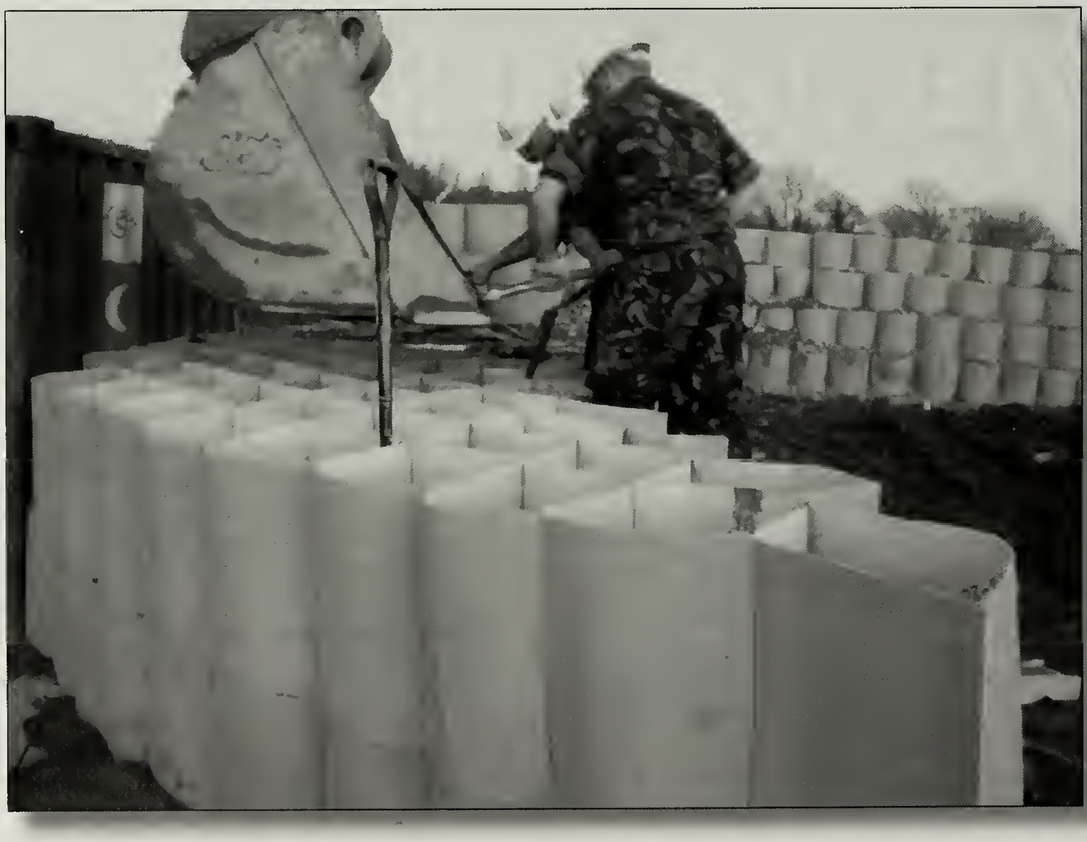
The higher headquarters of 39 Engineer Regiment (Air Support), 12 Engineer Brigade, approached Terram Ltd., a sister company of the U.S. firm Fiberweb™, because of the company's expertise in constructing geotextile cell berms for the oil and gas industry. Terram Ltd. provided a design that fulfilled all the requirements and, within four weeks of being contracted, manufactured the geotextile cells required to construct the berms for both ASPs and delivered 20 kilometers of geotextile cells. The reduction in the logistical requirement over alternate systems was a huge benefit when supplies had to travel thousands of miles, including passage through the Khyber Pass. And for Soldiers and commanders alike, the reduction of even one vehicle in a convoy is a real morale booster.

During the project, more than 16 kilometers of geotextile cells were laid until the required height was achieved. Approximately 20,000 cubic meters of sand were used to fill the cells, which were then compacted using plate compactors and heavy rollers. As the berms gained height, a crane lifted rollers atop the cells to allow compaction of the upper layers, adding to the stability and longevity of the design. A patented stacking system allows strong vertical walls to be constructed. This means that standard blast walls and compartments can be constructed, providing a realistic alternative to existing systems for the first time. This innovative product is emerging as a new generation in force protection systems that can provide additional capabilities or complement existing systems.

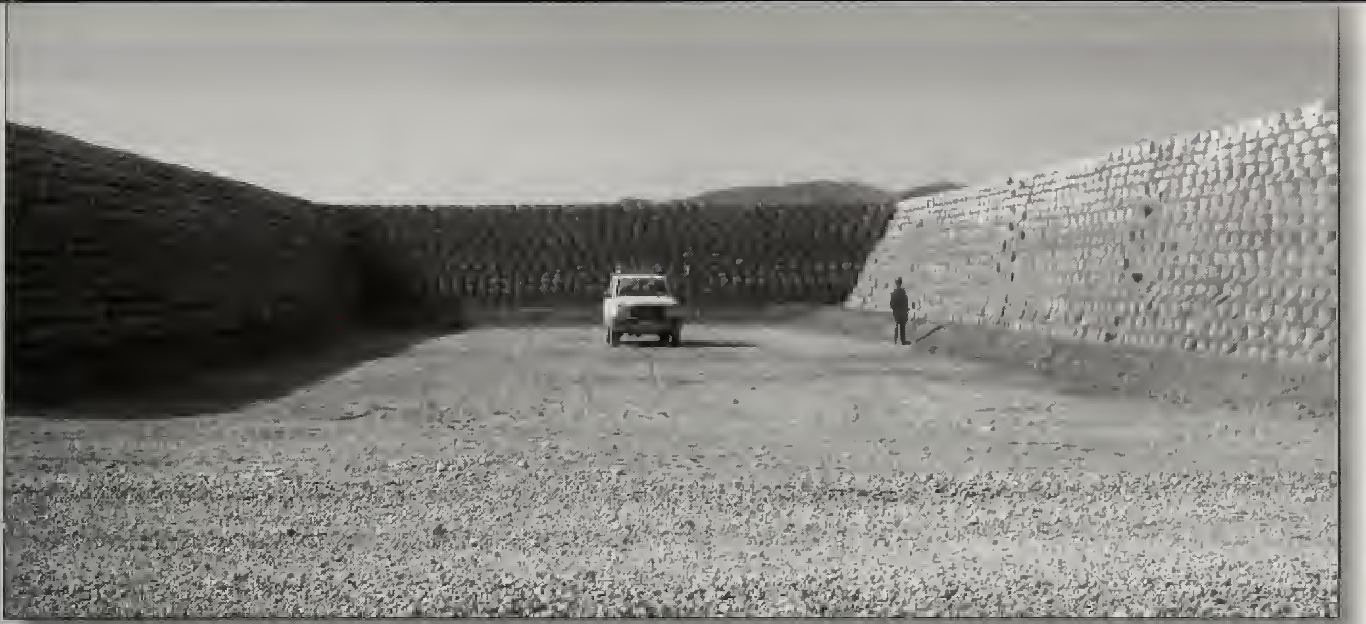
Comprehensive blast tests showed superior protection and revealed the design's ability to sustain damage to the outer cells while still retaining structural integrity overall. During these trials, another significant benefit of the cellular design was tested: its ability to sustain damage to the outer cells of a barrier while still retaining structural integrity overall. As a result of these tests, DefenCell has been specified as a barrier system for a number of security applications. As a ground stabilization product DefenCell is supplied in cells of two different sizes. In wet or unstable conditions, the cells are simply deployed, filled, and compacted to provide vehicle hardstand areas. Helicopter landing areas can also be established, with stabilizers added to the fill materials to prevent dust and downdraft erosion.

Additional Benefits

A key benefit of the DefenCell system is that it is very lightweight, nonmetallic, and compact. The individual units can be easily cut to shape and size and could be split down and readily man-packed. The system is packed on standard North Atlantic Treaty Organization (NATO) pallets and is readily air-droppable. The geotextile polymer has an ultraviolet (UV)-resistant additive, and barriers can be



DefenCell units form a protective barrier around a container.



An ammunition supply point is constructed from DefenCell units.

painted to suit local conditions or can be specially treated to meet specific requirements.

The deconstruction and disposal of temporary or semipermanent sites that the Corps constructed over the years has become a major issue recently. The large number of blast walls and other structures create a huge ecological problem and represent a vast amount of metal and other materials to dispose of. Because DefenCell units contain no metal, they are very easily dismantled and the geotextile material can be reused by the local population in civil engineering projects such as the construction of roads.

Summary

DefenCell is an innovative wall, barrier, and ground stabilization system that can provide a complement or alternative to current force protection resources while providing some significant additional benefits:

- Reduction of logistical footprint by more than 40 percent, which maximizes transport in-loads, reduces hazardous convoys, and cuts costs.
- Lightweight and air-droppable.
- Reduction of secondary fragmentation risk.
- Ease of dismantling in an environmentally sympathetic fashion.
- Simplicity of quickly building strong, load-bearing structures.
- Durability due to built-in UV protection.
- Ability to absorb damage while retaining structural integrity.
- Blast resistant.

More information on DefenCell can be found at <*www.defencell.com*>.

Warrant Officer 2 Graves serves in the Royal Engineers (RE), British Army. He began his career as a combat engineer and has deployed to Northern Ireland, Belize, Cyprus, Kenya, the Falkland Islands, and South Georgia in the Antarctic. He has deployed twice to the Balkans as part of the Mine Awareness Training Team. As a bomb disposal officer in 33 Engineer Regiment (EOD), he conducted EOD operations in the United Kingdom, Sierra Leone, and Kenya. He was selected in 2005 as sergeant major of 37 Armoured Engineer Squadron in Germany and deployed to Iraq on Operation Telic. WO2 Graves holds a master's in business administration and has completed more than 22 years service with the British Army.

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18th Engineer Brigade's Mission Rehearsal Exercise at JMRC

By Lieutenant Colonel Hank Thomsen

The Joint Multinational Readiness Center (JMRC) in Hohenfels, Germany, has been a combat training center for the U.S. Army for decades. JMRC is structured and resourced primarily to train and validate the U.S. Army, Europe's (USAREUR's) brigade combat teams (BCTs). Not until February-March 2008 had JMRC validated a functional engineer brigade for its mission in Operation Iraqi Freedom. With the recent restationing of the 130th Engineer Brigade to Hawaii, the 18th Engineer Brigade became USAREUR's only engineer brigade. As part of V Corps, the brigade coordinates and directs the full range of engineer activities in support of USAREUR operations. For its pending mission in Iraq, the brigade traveled to Hohenfels and Grafenwoehr to conduct gunnery training, platoon- and company-level situational training exercises (STXs), and a brigade mission rehearsal exercise (MRE).

A route clearance team interrogates a suspected IED with a surrogate Buffalo mine-protected vehicle.

Scenario Design Challenges

The scenario design for the brigade's MRE presented JMRC with numerous challenges. As a functional brigade, the 18th must be prepared to operate as a subordinate unit to a corps or division, without overall responsibility for any terrain or populace. Because of this, one of the most difficult challenges in designing the MRE was the replication of adjacent units—to include BCT and maneuver task force headquarters—and their area of operations for the 18th to coordinate with and operate within.

JMRC was also challenged by the need to replicate a command subordinate to the 18th Engineer Brigade. The battalions that were to make up the brigade's task organization in Iraq were not available for the MRE. The 54th Engineer Battalion, a unit subordinate to the 18th in USAREUR, was also validated as part of this exercise, and JMRC replicated the 94th Engineer Battalion (Construction Effects) to round out the brigade. Because replication of a brigade's subordinate battalion was a first for the training center, JMRC prepared as follows:

- Designated an engineer observer/controller (O/C) as the battalion operations and training (S-3) officer to plan and execute the simulated battalion's missions and prepare a steady state operational schedule or story line.
- Coordinated directly with the 94th Engineer Battalion to ensure that the replicated headquarters directed realistic mission sets, problems, and issues to the engineer brigade.
- Coordinated with the United States Army Engineer School, Fort Leonard Wood, Missouri, for personnel to round out the replicated headquarters, because the training center does not have many O/Cs experienced in construction engineering. These personnel provided much-needed expertise in replicating the construction effects battalion during the exercise.

- Simulated the 94th Engineer Battalion during the MRE. This included providing a full-time liaison officer in the 18th Engineer Brigade operations center who reported, conducted update and shift-change briefs, planned, and attended various working groups. Physically adjacent to the higher command headquarters, the simulated 94th Engineer Battalion operations center produced daily reports, answered requests for information, and ensured a coherent story line to challenge the 18th Engineer Brigade staff.

Along with augmentation from V Corps, JMRC replicated a division headquarters as a higher command. It recreated many of the functions of a division headquarters, to include typical battle rhythm events and orders production. The portrayal of a division improvised explosive device defeat (IEDD) working group, which included representatives from all the division's units, gave the 18th Engineer Brigade staff the opportunity to prepare for and participate in a division-level working group.

Ideally, the 18th Engineer Brigade would have conducted an MRE at JMRC simultaneously with a BCT. This would have forced the 18th to interact with a maneuver element that controlled terrain as the engineers conducted assured mobility and general engineering missions throughout the division area of operations. But because of deployment timelines and other USAREUR training events, this was not possible. To make up for this, JMRC simulated BCT headquarters to interact with the 18th Engineer Brigade headquarters and to populate the division operations with daily significant activities. Along with the brigade headquarters, JMRC scripted daily events in the Joint Conflict and Tactical Simulation (JCATS) system that populated the 18th's common operational picture. To ensure that the engineer brigade had a maneuver unit to interact with during route clearance missions on the ground, JMRC used an Army National Guard infantry company. This company was controlled by exercise control (EXCON) and the O/C team working with the 54th Engineer Battalion, conducting missions such as raids or cordon-and-search operations supported by the 54th's route clearance teams.

Establishing Objectives and a Timeline

In coordination with V Corps, the 18th Engineer Brigade and JMRC developed a set of training objectives and validation tasks that guided the development of the exercise. The validation tasks are those tasks that the brigade's senior trainer reviews upon completion of the exercise to ensure that the brigade is ready to deploy. JMRC exercise planners used these validation tasks to develop the exercise scenarios and brigade training missions.

Based on the unit's deployment timeline, JMRC and the engineer brigade developed an exercise timeline. The first portion of the training was the leader training program (LTP) for the brigade staff, conducted at JMRC. This training included classes on the military decision-making process, theater-specific briefings, and observation of the engineer brigade planning process. The engineer brigade LTP culminated with the brigade's orders briefing to subordinate battalions. The 54th Engineer Battalion then began its LTP at Grafenwoehr Training Area, followed closely by an STX at the platoon level, also conducted at Grafenwoehr. Following the platoon-level STX, the brigade moved to Hohenfels and executed a company-level STX and a command post exercise for the battalion and brigade headquarters.

Replicating the Environment

To properly portray the environment of the 18th Engineer Brigade's upcoming deployment, JMRC used numerous assets in the training area, to include civilians on the battlefield (COB), roving traffic jams, and simulated IEDs. As with any brigade MRE at JMRC, the training area was populated with hundreds of COBs, many of them Arabic-speaking, who populated the towns in the training area and served as role players. Each of the towns and its leaders had a background or storyline that has been developed

Opposing Force Soldiers train on replica IED construction and emplacement.

over the past few years during numerous counterinsurgency-based training exercises.

Most of the 18th Engineer Brigade's missions in the training area were based on route clearance. One of the many challenges facing units conducting route clearance in Iraq is the ability to perform their mission in the midst of mostly benign, but cumbersome, traffic. To replicate this traffic, JMRC used roving traffic jams consisting of groups of up to 30 nontactical vehicles controlled by EXCON and designed to cause congestion and confusion during the route clearance missions. The missions for these traffic jams were based on the 54th Engineer Battalion's route clearance schedule and were coordinated at the daily EXCON synchronization meeting. EXCON also made last-minute adjustments to the traffic jam missions with input from O/Cs and COBs.

A Soldier from the 18th Engineer Brigade conducts a survey of the JMRC short takeoff and landing strip.

Over the past few years, JMRC has developed a system to properly replicate IEDs. Because the 18th Engineer Brigade MRE involved units directly involved in neutralizing these devices, JMRC made a concerted effort to have realistic training IEDs on the ground. These devices consisted of initiation systems, training munitions or explosive devices, and effects simulators. The devices were based on systems found in the current theater of operations and were emplaced and controlled by Opposing Force Soldiers from the 1st Battalion, 4th Infantry Regiment, and supervised by JMRC fire markers, the Dragons.

Brigade Missions During the MRE

The 18th Engineer Brigade focused on two main types of missions during their MRE—assured mobility missions in the form of route clearance and numerous general engineering missions.

Assured Mobility

The brigade was tasked by the division to ensure that priority supply routes were routinely cleared by its subordinate unit, the 54th Engineer Battalion. The brigade also received orders to support named operations with route clearance assets. Before executing route clearance missions, the engineer brigade and battalion had to coordinate boundary crossings and any needed support with the appropriate maneuver units, such as quick reaction force, recovery, or air support units. JMRC replicated these maneuver brigade and battalion headquarters with the task force analyst staff.

JMRC provided replicated maneuver units as terrain owners, not only to feed significant actions and operational information to the 18th Engineer Brigade but also to act as response cells to route clearance teams moving throughout the area of operations. Platoon leaders coordinated with land-owning units for cross-boundary coordination and for quick reaction force and maintenance recovery assets when overwhelmed by enemy activity. This forced the leader on the ground to initiate contact with the maneuver unit and conduct on-site linkup.

General Engineering

To stimulate the brigade's construction planning, the division tasked the brigade to plan numerous construction projects. These projects included the design of a joint security site, a forward operating base upgrade, and a short takeoff and landing airstrip for unmanned aircraft system operations. The airstrip design was directed during the brigade's LTP, and the planning carried through the entire MRE. It culminated in a back-brief to the division commander.

Gleaning the Lessons Learned

In the War on Terrorism, JMRC must not only train BCTs but also functional brigades before their deployments to Operation Iraqi Freedom or Operation Enduring Freedom. The Army's combat training centers must be flexible in their preparation for any training exercise. The use of all available assets, to include contact with deployed engineer battalions and brigades, support from V Corps engineers, the Engineer School, and the joint IEDD organization ensured that the 18th Engineer Brigade received a quality training event in preparation for deployment.

Lieutenant Colonel Thomsen is currently serving as the chief of engineer doctrine at the United States Army Maneuver Support Center, Fort Leonard Wood, Missouri. His past assignments include service as an engineer observer-controller at the Joint Multinational Readiness Center in Hohenfels, Germany, duties with engineer battalions in Germany and at Fort Bragg, North Carolina, and as an assistant professor in the Department of Civil and Mechanical Engineering at the United States Military Academy (USMA) at West Point, New York.

A QUICK INTRODUCTION TO NATO ENGINEERING

Lieutenant Colonel David L. Knellinger

Throughout the 20th and into the 21st century, the United States Army has been involved with multinational—or combined—operations. The majority of time during deployments is spent not in support of kinetic operations, but rather stability operations and civil support operations, such as those in Bosnia, Kosovo, Afghanistan, and Iraq. All are examples of combined operations with a relatively short warfighting period (less than a year), followed by longer periods of stability operations. These may last several years—or even decades—in Afghanistan and Iraq. For some of our allies—including most of our North Atlantic Treaty Organization (NATO) partners—it is politically easier to support these stability operations than traditional warfighting. These combined stabilization missions, which tend to need more engineer effort, mean that more and more engineer units will operate in a combined environment. This article describes how NATO headquarters view engineers, specifically noting the differences in organization and function inside the headquarters itself. It also describes lessons learned through a tour of the International Security Assistance Force (ISAF) headquarters and a tour with the NATO Allied Rapid Reaction Corps (ARRC) headquarters.

Organization of a NATO Engineer Branch

Most NATO engineer branches are divided into four sections:

- Plans
- Operations
- Infrastructure
- Intelligence

For the purpose of this article, the term "NATO headquarters" is used to describe headquarters for joint

A NATO convoy patrols in Afghanistan.

forces, a land component, or a corps. Because headquarters at division and lower levels are nationally pure, they conduct engineer planning according to their own national structures.

Plans and Operations Sections

The plans and operations sections in a NATO headquarters are similar to their U.S. counterparts. Their mission is to support the planning process in the headquarters. However, delivering against this mission is more challenging than in a U.S. headquarters. There are numerous engineer units with different structures and capabilities in each country's army. Having a true understanding of what engineering capability is present inside each nation's formations is a precise and demanding job. This process has become harder since deployments now include Partnership for Peace (PfP) countries. The engineer plans and operations sections must now know the equipment and capabilities of both NATO and former Warsaw Pact nations to accurately describe engineer capabilities and efforts to the higher commander.

The multinational engineer brigade improves a road outside Kabul.

When writing orders, the engineer plans section must focus subordinate engineer effort as precisely as possible, but not to the point of limiting the ability of subordinate engineer formations to operate on the battlefield. A limiting order will deny the subordinate engineer commanders the ability to conduct their missions according to their own national priorities. This conflict can lead to a stalemate in engineer activity or to engineer efforts dedicated exclusively to national missions rather than attempts to achieve the higher commander's desired effects.

Infrastructure Section

The engineer infrastructure section has a very limited range in its support of NATO infrastructure. The country that has responsibility for a particular area of operations also has responsibility for building the infrastructure to support that mission; costs lie where they fall. Therefore, countries will build what they think they need, but to their own national standards. There are no NATO standards for individual buildings or bases. NATO infrastructure engineers only have proponency for a few common-use items. Airfield runways and the NATO headquarters itself are the primary examples of items that fall into this section's purview. This limits the scope and capabilities of the infrastructure branch and makes it dependent upon outside agencies such as the United States Army Corps of Engineers for technical advice and quality control.

Intelligence Section

The engineer intelligence section's mission depends on the commander's main effort. The section's original mission is to understand the enemy engineer's capability and doctrine. With that mission, it would coordinate directly with the all-source cell in the corps intelligence (G-2) section, providing subject matter expertise to the G-2 section's analysis of the enemy. With the ending of the Cold War, the branch has a more varied mission set. Now the branch may be responsible for supporting improvised explosive device defeat (IEDD), analyzing host nation infrastructure for intelligence preparation of the battlefield, or monitoring current and future planned reconstruction and development projects. All of these missions require the engineer intelligence officer to coordinate with numerous branches in the headquarters.

Geographic Section

It is important to note that the geographic section was not mentioned as being part of the engineer branch. This section is located in the G-2 section in most NATO headquarters. While this organization helps the intelligence community with its mission, it limits the ability of the engineer branch to maintain positive control of all engineers in the headquarters.

Engineer Branch Within the Headquarters

Subordinate formations must understand the true abilities of a NATO headquarters to support engineer operations throughout the theater. The engineer branch in the typical headquarters is limited in both personnel and location. Subordinate formations must note these constraints and tailor their requests to the engineer branch.

In most cases, the engineer branch is part of a larger logistics branch and is controlled by the Deputy Chief of Staff for Combat Service Support (DCOS CSS). This is different from a U.S. headquarters, where the engineer branch is numbered—G-7—and works directly for the chief of staff. (In NATO, G-7 designates training.) In addition, the headquarters plans and operations branches will not have dedicated engineers. Any engineer analysis or input required for orders has to come from the engineer branch itself. This is different from U.S. engineer manning, which has a separate engineer section in the plans and operations (G-3) branch.

Where the engineer branch is located in the headquarters limits its scope. While the plans and operations sections should be concerned with all aspects of engineers on the battlefield, they may be limited by their DCOS CSS to looking only at sustainability and infrastructure operations. The DCOS CSS also may limit the scope of work for the intelligence and infrastructure sections to looking at sustainment issues, rather than engineer effects across the entire battlefield.

Within the headquarters, NATO engineers must always be proactive in communicating with other branches, no matter where the engineers are in the headquarters. Specifically, the engineer branch must maintain constant liaison with the headquarters plans and operations sections, or the engineer effort can become unsynchronized with the maneuver efforts.

Lessons Learned

Language and doctrinal terms must be used precisely in a NATO headquarters. Within the engineer branch of the ARRC, there were assigned members from six different nations, speaking five languages. Across the ARRC, there were members from 16 different nations. Precise phrasing of orders and correct use of doctrinal terms are mandatory to ensure that the mission is even understood, much less accomplished. While a person may take additional measures to ensure that a product is understood by a person who does not speak English as a first language, there is also a considerable gap in language between American and British personnel. You may feel comfortable with using idioms with British (or Canadian) individuals, but your meanings or intent may be significantly distorted. When in doubt, ask for feedback for all correspondence.

A corollary to this lesson is refusal to discount an individual's capability if you do not initially understand them due to a language difference. This dovetails with the lesson that you cannot walk into a multinational headquarters with any cultural biases or preconceived notions about the capabilities of a particular country's armed forces. All armies have good and bad individuals, so all-encompassing statements about groups of people are rarely accurate. Once you are assigned to the unit, you must make the time to talk to all individuals to understand their strengths and weaknesses. Failure to understand your surroundings may cause you to discount a potential resource.

Within NATO, there are preconceived notions about the United States Army. The size and funding of our Army are well known and often discussed. Also known are U.S. policies, to include our positions concerning Afghanistan and Iraq, and our refusal to sign the Ottawa Land Mine Treaty. All of these lead to certain perceptions concerning both the United States and the members of its armed forces. Individuals must work through these perceptions to succeed in their jobs.

Communicating with nongovernmental organizations (NGOs) and the international community (IC) during deployments is essential during stabilization operations. These agencies are the principle developers in the nations where we operate. Military security and reconstruction efforts and NGO/IC development projects must be synchronized to create long-term stabilization effects. Engineers, in conjunction with the civil-military cooperation section, must create and maintain close relationships with these agencies. Specific information must include—

- Goals and objectives for particular programs.
- Limitations and flexibility of funding.
- Locations of current and planned projects.

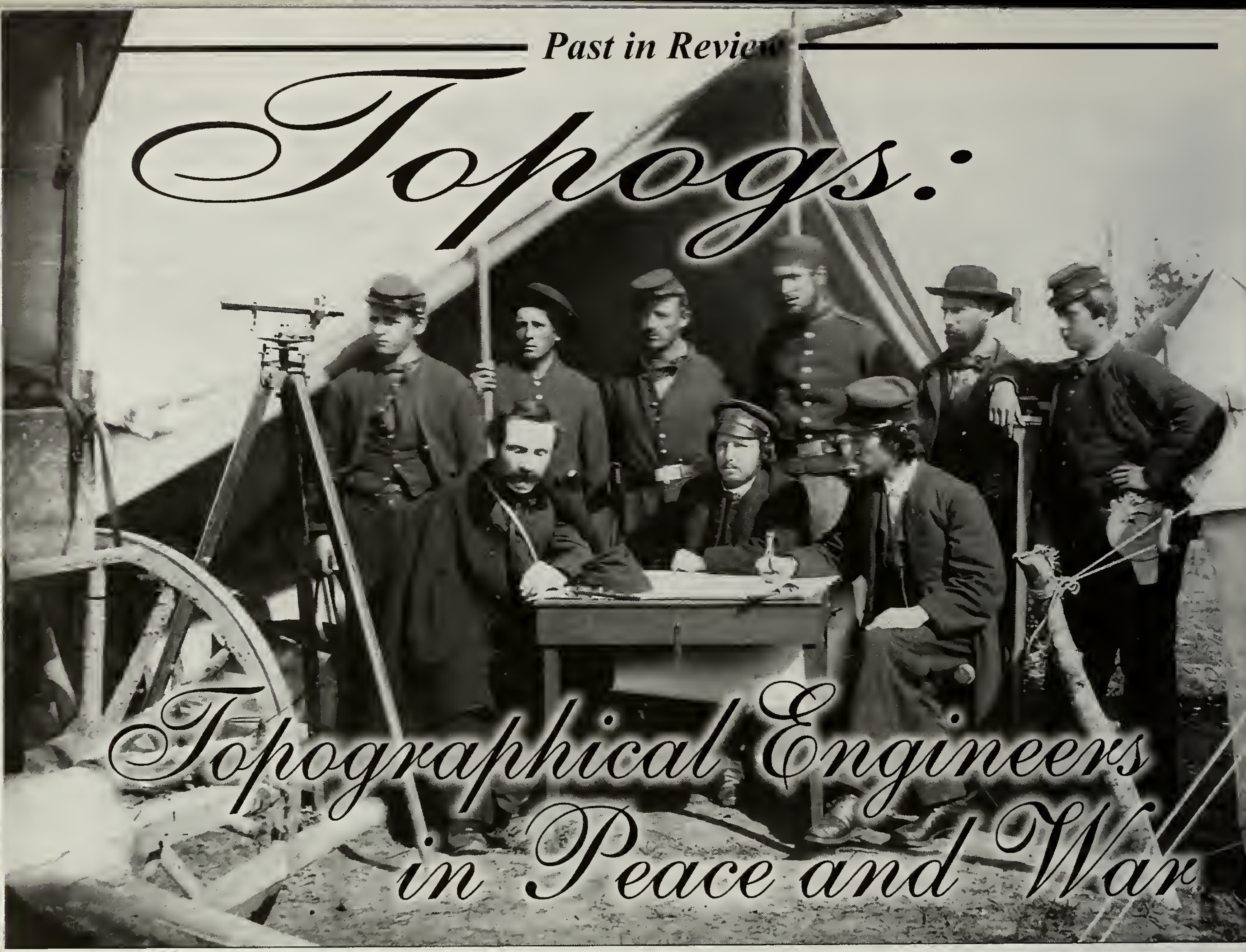
Not understanding the development situation in the area of operations limits the abilities of engineers and the commanders we work for.

Conclusion

Engineer branches in a NATO headquarters are configured differently from those in U.S. headquarters. They are limited in capability and reach compared to American engineers. All engineers who will work in a NATO environment must understand the capabilities and limitations of these branches. There are also some key lessons that engineers must understand before working in a NATO environment. These include precise phrasing of orders and correct use of doctrinal terms, the rejection of cultural bias, and understanding of perceptions of the United States among NATO personnel. Finally, engineers working in a deployed environment must understand the whole stabilization environment in order to create long-lasting effects.

Lieutenant Colonel Knellinger is the Engineer Branch plans officer for the Allied Rapid Reaction Corps in Rheindahlen, Germany. He has served as the Afghan Development Officer for the International Security Assistance Force IX in Kabul, Afghanistan. Before that, he served in the 1st Infantry Division as the operations and training officer of the Engineer Brigade and executive officer of the 82d Engineer Battalion during Operation Iraqi Freedom. He holds a bachelor's in systems engineering from West Point and a master's in operations research from Georgia Institute of Technology.

Topogs: Topographical Engineers in Peace and War



Photograph by James Gibson (Library of Congress)

By Mr. Gustav Person

Although the topographical engineers only served the United States Army as a separate branch for a relatively short period of time, their accomplishments were considerable. They achieved significant geographic and scientific discoveries, broadened our knowledge of unexplored areas, and contributed to the nation's desire to achieve its Manifest Destiny. Their wartime surveying techniques provided the most up-to-date and accurate maps, and during periods of peace they labored extensively on civil works projects authorized by Congress. This article examines the origins and the significant roles of the topographical engineers in the early 19th century and many of the important officers and their accomplishments, and it will end with their service during the Civil War.

Origins

Unlike the Corps of Engineers, the *topogs*, as they were usually known, lacked a central office or branch as a separate corps for much of their existence. For example, in the first quarter of the 19th century, the War Department generally assigned them as individual staff officers to the two military departments.[1]

During the War of Independence, at least three men had performed topographical and geographical duties for the Continental Army. Topogs were first appointed officially during the War of 1812. An act of Congress on 2 March 1813 authorized the appointment, as part of the general staff, of eight topogs with the brevet rank, pay, and emoluments of majors of cavalry and eight assistants with the brevet rank, pay, and emoluments of captains of infantry. As prescribed in the later 1841 regulations, the duties of the topogs "shall consist, in surveys for the defense of the frontier, inland and the Atlantic, and of positions for fortifications; in reconnoissances [sic] of the country through which an army has to pass, or in which it has to operate; in the examination of all routes of communication by land or by water, both for supplies and military movements; in the construction of military roads and permanent bridges connected with them and, in the absence of an officer or officers of the Corps of Engineers, of military bridges, and of field-works, for the defense of encampments, fords, ferries and bridges. For which purposes, officers of the Corps of Topographical Engineers shall always accompany armies in the field."[2]

The topogs were disbanded in 1815 by the act of 3 March that reduced most of the Army. In spite of the 1815 housecleaning, some continuity was maintained as two of the topographers, Majors John Anderson and Isaac Roberdeau were kept on active duty to complete surveys of the northern frontier and Lake Champlain. The following year, topogs were again authorized to assist the Board of Engineers for Fortifications. In 1818, the regulations assigned them fully to the Engineer Department, along with the United States Military Academy at West Point and the Board of Engineers for Fortifications, and made them subject to the orders of its chief. Thereafter, a few topogs usually found themselves assigned to fortifications work. In August, a further regulation of the War Department established a Topographical Bureau in the Engineer Department. Located in Washington, D.C., the Bureau's main duties consisted of housekeeping tasks but not control over programs or personnel. The Bureau collected and preserved the specimens brought back by scientific expeditions, compiled maps, and stored and cared for the topogs' survey instruments.[3]

The partnership between officers of the Corps of Engineers and the topographers was uneasy. The competition for work and influence between the engineer and topographical officers resulted in substantial bitterness and tension. An additional reason for the animosity was that regular engineer officers were chosen from the top ranks of graduating West Point classes; topographical engineers were normally chosen from the second rank or from civilian life.[4]

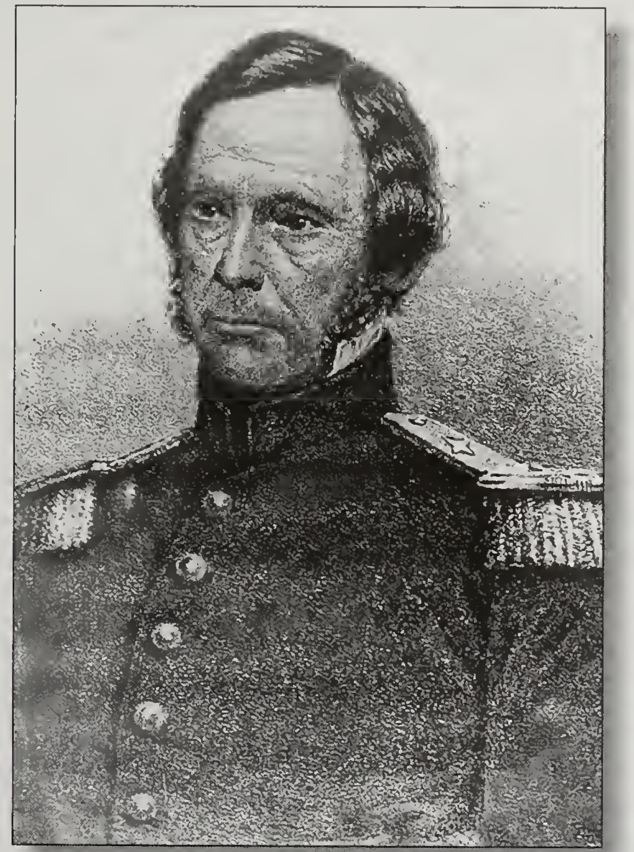
Civil Works

By 1824, the importance of waterways, canals, roads, and bridges in the young nation was clear. These were the paths of commerce and westward expansion. On 30 April 1824, Congress passed the General Survey Act, which sought "to procure the necessary surveys, plans, and estimates upon the subject of roads and canals." It authorized the president to direct work on routes considered of national importance for commercial, military, or postal service purposes. Congress provided $30,000 to cover expenses. To carry out the surveys, the president was authorized to hire additional civil engineers to augment the topogs. A further act on 24 May appropriated $75,000 to improve navigation on the Ohio and Mississippi Rivers. Within a week, President James Monroe appointed a Board of Engineers for Internal Improvements to administer the General Survey Act. By the end of 1824, all ten topogs had been assigned to internal improvement projects. During 1826, Major Stephen H. Long supervised the construction of a wing dam on the Ohio River, as well as supervised commercially developed steam-powered snagboats to clear the river of hazardous limbs and debris to improve navigation. Long had graduated from Dartmouth College in 1809. He joined the topogs in 1816 and taught mathematics at West Point for two years. Thereafter, he had a wide-ranging career as an explorer, railroad and river engineer, and inventor. His duties at this time also involved ensuring the navigability of the Mississippi River. By 1830, topogs led 10 of the 13 surveys for canals, roads, and railroads, while civilians headed the other three.[5]

Meanwhile, the Engineer Corps officers began to shoulder the major tasks of designing and building the fortifications that would guard the eastern seaboard and the Gulf of Mexico. The topogs actually transferred to the Corps of Engineers all their plans and drawings of fortifications.

Throughout the 1830s, the topogs carried out internal improvements to the country, both governmental and private. After surveys had been completed, all governmental projects were carried out on contracts superintended by the Corps of Engineers and the Quartermaster Department. Major Long gained a reputation as a railroad engineer during this time and was employed on such projects in New England and the South. Upon the reestablishment of the United States Coast Survey as part of the Treasury Department in 1836, the topogs again became associated with this work. Thereafter, until 1863, one or two officers were always assigned to this duty.

Beginning in 1834, the topogs were employed with the construction of lighthouses. These were turned over to the Treasury Department for administration upon their completion. When the United States Lighthouse Board was established in 1852, two topogs were appointed as members.[6]



Colonel Stephen H. Long, last Chief of Topographic Engineers, 1861-1863 (Office of History, U.S. Army Corps of Engineers)

Colonel John J. Abert, Chief of Topographic Engineers, 1838-1861, Engraving by J.C. Buttre (Office of History, U.S. Army Corps of Engineers)

In January 1829, Lieutenant Colonel Isaac Roberdeau suddenly died and, after some deliberation, Major John J. Abert took over as the head of the Topographical Bureau. During the following year, he succeeded in gaining representation on the Board of Engineers for Internal Improvements; however, the Secretary of War abolished that board in 1831.[7]

Abert had graduated from West Point in 1811, but resigned from the Army to become a lawyer. He reentered the service in 1814 as a private soldier in the District of Columbia Militia and fought in the Battle of Bladensburg in August of that year. He became a topog in November and served until his retirement in 1861. Abert recognized that he needed immediate help. His two additional sources of assistance each year were 20 to 30 officers from other branches of the Army and 10 to 15 civilian engineers. He also began work to establish a separate Corps of Topographical Engineers, a project that would take almost ten years. Meanwhile, Abert began to consolidate and increase his responsibilities. For example, up until 1836 the Corps of Engineers had handled all river and harbor construction projects, but in that year the War Department transferred several Great Lakes and Lake Champlain projects to the Topographical Bureau.[8]

With so many plans for the future, and his officers thoroughly engaged in a variety of civil projects, Abert was unprepared to meet the cartographic needs of the Army during the Second Seminole War. The first war in 1818 had only required the assistance of one of the Army's ten topogs. The second war in 1836 placed a much greater demand on them. The lack of data relating to Florida seriously impeded operations against the Seminoles who sought refuge in the Everglades. By the end of that year, eight topogs—diverted from civil works projects—were in the field with various forces, performing reconnaissance, collecting topographical information, and drawing maps. Topographers later stayed in Florida through the 1840s, building and maintaining roads, as well as collecting data, making surveys, and updating maps.[9]

Throughout the 1830s, Abert continued to urge the formation of a Corps of Topographical Engineers. He based his arguments on the solid premise that the work of the topogs was vital to the country's military security and of great benefit to its economic progress. He pointed out that this move would be less expensive than the continual hiring of civil engineers to perform the work that had been too extensive for the few topogs. He also noted that efficiency would be promoted by ending the practice of detailing line officers, for much time had to be spent in training them—usually two years. Abert's efforts were energetically supported by Secretaries of War Lewis Cass and Joel R. Poinsett and resulted in the organization of the Corps on 5 July 1838. A provision was included to increase the size of the new organization to consist of one colonel (Abert), one lieutenant colonel, four majors, ten captains, ten first lieutenants, and ten second lieutenants—a total of 36 officers. As before, no enlisted personnel were assigned to the topogs. In a further move, Secretary Poinsett ordered—on 1 August 1838—the assignment to the topogs of "all new works of improvement, not of a military character, [and] not connected with the fortifications." Therefore, between 1838 and 1841, the Engineer Department transferred more than 70 civil works projects to the topogs. Chief among those projects was the construction by Major Long of a number of inland Marine Hospital Service facilities around the country for disabled seamen.[10]

Western Expansion

During the late 1830s and 1840s, a number of topogs conducted widespread explorations of the West. Beginning in 1838, John C. Fremont, a newly appointed second lieutenant (but not a West Pointer), conducted a reconnaissance of the Upper Mississippi and Missouri Rivers. Fremont explored the Oregon Trail to the Columbia River and California in 1842-45. His reports became guidebooks for the many emigrants flowing toward the new lands. Upon his third and last expedition for the government, he detached Lieutenants James W. Abert, the colonel's son, and William G. Peck—in August 1845 at Bent's Fort on the Arkansas River—to survey the Canadian and Washita Rivers. In the same year, Lieutenant William B.

Franklin accompanied Colonel Stephen W. Kearney's military expedition along the Oregon Trail. On his march to Santa Fe and San Diego in 1846, Kearney's route was sketched and described by Lieutenants William H. Emory and William H. Warner.[11]

In 1846-48, many of the topogs were withdrawn from civil projects to participate in the war with Mexico. Two-thirds of the 36 men of the Corps served in the field with various tactical commands, independent of the bureau. In California, Fremont became involved in the Bear Flag revolt and the overthrow of Mexican rule. Captain Joseph E. Johnston accepted a promotion to lieutenant colonel and became second in command of the Regiment of Voltigeurs and Foot Riflemen, a new unit of mixed cavalry and infantry. Captain George Hughes became military governor of the area around Jalapa and Perote, northwest of Vera Cruz, with Emory as his lieutenant governor. Major Long built steamships for the Quartermaster Department in Texas. Topogs played important roles in all the major battles along the road to Mexico City, engaged in reconnaissance, scouting, and combat operations. Throughout the war, the majority of the topogs kept their technical lines of communication open to the Bureau and Colonel Abert. He had reason to speak proudly of his officers. The topogs, he said, showed "the versatility of talent in the Corps and its ability to fulfill any military duties which it may be found necessary or proper to assign to it."[12]

The acquisition of the vast Southwest from Mexico, as a result of the war, and the settlement of the Oregon controversy with Britain, opened up the Far West for further exploration by the topogs and the undertaking of numerous boundary surveys. Before and after 1853, Captain Emory successfully surveyed the difficult and complex boundary of the Gadsden Purchase separating Mexico and the Southwest. The creation of new states and territories provided further boundary work for the topogs. For several years after 1853, Lieutenant Gouverneur K. Warren and other topogs were chiefly engaged in surveys of four routes for railroads from the Mississippi to the Pacific coast. As part of this work, Warren actually went on three expeditions to the northern plains during 1855-57. Unfortunately, Secretary of War Jefferson Davis later took the Pacific Railroad surveys from Abert's control and placed them under a new Office of Exploration and Survey that reported directly to him. Although these explorations demonstrated the practicability of spanning the continent with railroads along various routes, none was completed until after the Civil War.[13]

During the two decades prior to the 1850s, the topogs had flourished. They had achieved independence from the Engineer Department; acquired an elite corps of 40 capable, experienced, and dedicated officers; created and preserved an invaluable collection of maps, charts, and reports; expanded its range of duties and activities; established a number of field offices; and appeared capable of handling the kind of engineering tasks that the President, Congress, or the War Department might assign to it. During the 1850s, however, the Corps declined. It lost the services of several of its best officers, and the others were overworked. It lost completely, or in part, some of its most important functions, including lighthouse construction. Its prestige diminished, and favoritism and

The staff of Topographic Engineers, Headquarters, Army of the Cumberland

intrigue replaced purposefulness and direction. The decline began slowly after 1850, but picked up speed as the decade progressed. By 1861, the Corps was foundering badly.[14]

Yet, during this period, the Corps achieved some remarkable results. On and off for the entire decade of the 1850s, Captain Andrew A. Humphreys, assisted by Lieutenant Henry L. Abbot, conducted a major hydrographic study of the Mississippi River Delta. A chief objective was the best means of securing a wide navigation channel at the river's mouth. Their 1861, 500-page report entitled, "Report upon the Physics and Hydraulics of the Mississippi River," and later translated into a number of foreign languages, is still regarded as a model scientific study.

Some 6,000 miles of Great Lakes shoreline required surveying and exploration. The Great Lakes Survey had actually started in 1823. From 1841-60, Congress appropriated a total of $640,000 for the survey. Major James Graham and Captain George G. Meade were the chief topogs engaged in these duties throughout the 1850s. Despite those successes, other science-oriented federal agencies were being established, and they began to assume some of the duties of the topogs. The existence of the Smithsonian Institution, the Naval Observatory, the Office of the United States Coast Survey, and the Pacific Wagon Road Office in the Department of the Interior reduced the prestige of the topogs from the levels prevalent in the previous decades.[15]

Civil War

Colonel Abert's leadership abilities had declined with age and failing health. In 1861, just three days before the firing on Fort Sumter, the 73-year-old colonel was involuntarily retired because of physical disability. He was temporarily succeeded by Lieutenant Colonel Hartman Bache, and then by Colonel Stephen Long, himself a septuagenarian. Long would only serve as chief for less than one year, and a good part of that time was spent on leave. He has been described by historian Garry D. Ryan as "old, tired, uninspiring, and uninterested." With the coming of war, the few civil works under the direction of the topogs were suspended. Only the Great Lakes Survey survived the war.[16]

In two acts of Congress passed on 3 and 6 August 1861, the Corps of Engineers and the topogs were each authorized an additional 12 officers. From a total of 45 officers at the beginning of 1861, the topogs were reduced a year later to 28 as a result of seven officers resigning to join the Confederacy, four forced retirements, and others who accepted senior promotions in the volunteer forces. The War Department also gradually assigned the remaining topogs to duties that placed them under the directions of some authority other than the chief of the Corps. Twenty-four topogs were eventually promoted to general officer rank, an impressive number indeed. Four others lost their lives during the struggle.[17]

The question of rank was of particular importance to both Corps. The members simply held grades too low to serve efficiently in the field. Rarely did anyone above the rank of major serve as an engineer in the field; most were lieutenants and captains. Because they were prevented from accepting regimental volunteer commissions at the beginning of the war, these officers were frustrated that they, considered the elite of the army, were not sharing in the opportunities and benefits of wartime expansion. It is not surprising that those who could quickly accepted promotions in the volunteer forces outside their own Corps.[18]

The topogs were also authorized to organize a company of enlisted men. In 1845, as tensions with Mexico mounted, Abert had sought authorization to raise a company of 100 men to assist in making maps and surveys. Congress ignored his request, so the topogs had to find their own assistants who were mainly civilians. In September 1861, two lieutenants were ordered to Boston to begin recruiting duties. This effort was notably unsuccessful. The Corps lacked a central depot, officers for instruction, and experienced sergeants. It also had to compete with volunteer units. Finally, since only a handful of recruits had come forward, these men were later transferred to the Corps of Engineers. The topogs never did field a company.[19]

By May 1862, the topogs had sent 24 of their remaining 30 officers to the war on active field duty. The relationship of these officers to the various headquarters was not entirely clear. During the Peninsula Campaign, the chief engineer of the Army of the Potomac diverted members of the topographical engineer staff to ordinary engineer duties, and one member, Lieutenant Henry Abbot, was assigned as his personal aide. During the later Atlanta Campaign, the chief topog of the Army of the Cumberland discovered that two of the three Army corps commanders had countermanded his instructions and were refusing to allow their topographical officers to pass on information to Army headquarters.[20]

In the Western Theater at the beginning of the war, the armies operated with few resources. Only two topogs were available to map the entire region from the Appalachians to the Trans-Mississippi. Yet, the experience of the Army of the Cumberland was quite notable. In November 1862, Major General William S. Rosecrans immediately ordered the expansion of the topog staffs at brigade, division, and corps headquarters. The information, compiled and supplemented at each echelon, would travel up the chain of command to the topographical office at army headquarters, where it was turned into finished maps and published. "Skeleton" maps were continually updated, and this operation developed into a high state of efficiency.

Among the most important advances made during the war were the techniques of map reproduction. Before 1861, the Topographical Bureau at the War Department possessed no presses of its own and was compelled to use commercial printers. This practice continued during the war. During 1864, for example, 20,938 commercial maps sheets were issued to the armies. The printing presses of the Coast Survey were also used to supply 42,000 sheets in 1862 alone. In the field, armies organized their own lithographic press operations to publish maps. Photography was also applied to map reproduction with excellent results. The most effective topographical section in the field was that of the Army of the Cumberland. Captain William Merrill took an inefficient section and boosted its productivity. He obtained lithographic presses and cameras and staffed the section with 38 draftsmen, printers, and photographers under a volunteer officer, Captain William Margedant. Captain Margedant had invented a new technique of rapid map reproduction using black tracing paper set over special photographic paper and exposed directly to sunlight. Using all these reproduction techniques, the topographical section of that Army followed closely behind the front lines in Georgia in 1864, printing map after map. During the Atlanta Campaign, the section issued at least 4,000 campaign maps. In July alone, the section published more than 1,000 sheets of 14 different maps.[21]

The Corps of Topographical Engineers remained a separate branch of the Army until 1863, primarily because of the abilities of its former chief, Colonel Abert. However, the attempt to abolish the Corps and the Topographical Bureau went back to Secretary of War Davis' report of December 1854 in which he asserted his conviction that the continuation of a separate Corps of Topographical Engineers was "inexpedient." In 1861, the Chief of Engineers, Colonel Joseph G. Totten, opposed the move, although a number of junior officers of both Corps favored an amalgamation of the two organizations. Colonel Long, however, made no attempt to stop it. By 1863, the exigencies of war had largely broken down the artificial barriers that separated the duties of the two Corps. Younger topogs, as well as engineers, were now engaged in the construction of bridges, blockhouses, entrenchments, and other permanent works. They also harbored a common grievance against the War Department's promotion policies. Major General George McClellan, himself a former engineer officer, sent a petition to Secretary of War Edwin Stanton recommending the merger in June 1862. Congress considered the resulting bill during the following months, with a number of changes made to the original proposal. On 2 March 1863, the Senate approved the bill by a 26 to 10 vote. The House accepted the Senate's amendments with little argument, and the bill became law on the following day. The unification of the two Corps, announced to the Army in War Department General Orders No. 73, dated 24 March 1863, was finally completed in fact as well as law on 8 August 1866, with the appointment of Andrew A. Humphreys, a former topographical engineer, as Chief of Engineers.[22]

Summary

For nearly two decades, the topographical engineers had functioned as a major scientific agency of the federal government. At a time when the Corps of Engineers was primarily involved in the coastal fortifications program, the topogs led the way in exploration, internal development, and other civil works. It was only declining fortunes and forces beyond their control that brought the extinction of the Corps of Topographical Engineers as a distinct branch of the Army. Their services within the Corps of Engineers, however, continue to this day.

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Operation Sand Castle 2008:
Taking It to the Next Level and Beyond

By Major Jon A. Brierton

The sun rises over Forward Operating Base (FOB) Santa Fe, located in "The Box" at the National Training Center (NTC), Fort Irwin, California, for another rotation of Operation Sand Castle, where the 412th Engineer Command serves as the action agent for the United States Army Reserve Command's current Army Force Generation exercise. A unique feature of this exercise is the requirement that the Active Army brigade combat team (BCT) and the Army Reserve brigade coexist in the same operational environment as they would in-theater. Each component has to adapt to the other, thus creating a mutually supporting relationship that yields an overall stronger fighting force.

However, the training that occurs between the two components is just the beginning. In addition to training individual Soldiers, Operation Sand Castle gives the Army a chance to exercise its newest operational structure. The 301st Maneuver Enhancement Brigade (MEB) from Fort Lewis, Washington, and the 210th Regional Support Group (RSG) from Fort Buchanan, Puerto Rico, are two new structures in the Army. This year's operation focused on emerging MEB and RSG doctrine and the dynamics that take place between the senior-level commands within a BCT's operational environment, executing full spectrum counterinsurgency operations. NTC provides the opportunity to test these structures as new doctrine is still being developed.

The 301st MEB and 210th RSG catapulted the exercise to the next level by planning, coordinating, and executing a robust training plan which, coupled with the desert environment and the NTC rotational scenario, resulted in conditions that resemble those in Iraq and Afghanistan. The 301st MEB—consisting of engineer, military police, and chemical battalions—coordinated with the 2d Heavy Brigade Combat Team, 1st Infantry Division (2/1 HBCT), from Fort Riley, Kansas, and controlled all operations off the FOB, while the 210th RSG controlled all operations on the FOB.

The 301st MEB operated in "The Box," coordinating and supporting 2/1 HBCT with mobility through its gap-crossing and route clearance capabilities and with horizontal and vertical engineer capabilities not resident in the BCT command structure. During an attack on the National Urban Warfare Complex (NUWC), known as *Medina Jabal*, the 301st MEB exercised its air space management and fires control capability by coordinating with the BCT close-air and fire support assets to mitigate the Opposing Force (OPFOR) attack. Within minutes, Apache helicopters were over the site, providing relief to the Operation Sand Castle units, and unmanned aerial vehicles circled the area to keep the OPFOR away.

The mock village of *Medina Jabal* gives Soldiers a realistic taste of duty in Iraq.

Throughout the operation, the 301st MEB directed mounted combat patrols, route reconnaissance, route security, and mobility operations in a competitive environment while directing simultaneous construction operations at the NUWC, the mock village of *Medina Wasl* at Four Corners, the rock quarry, and the southeast corner of Area of Operation Bronco, along Alternate Supply Route Long Island. The mission at Four Corners was an extra project assigned when the 301st MEB hit the ground. This complex project consisted of constructing a 90-foot concrete traffic circle near *Medina Wasl*. The 365th Engineer Battalion tackled the project and when it was finished, the 301st, 2/1 HBCT, and the village mayor conducted a ribbon-cutting ceremony with townspeople attending the event as they would in Iraq.

NTC's mission is to prepare Soldiers, Sailors, Airmen, and Marines for deployment in support of the War on Terrorism. The main focus of Operation Sand Castle is to prepare Army Reserve Soldiers for potential deployments, and the operational mission is to provide upgrades to NTC facilities and the NUWC, the premier training area for BCTs. Operation Sand Castle, now entering the fourth year of a planned ten-year operation, is improving the infrastructure of the NUWC to replicate conditions in Iraq and Afghanistan more accurately, so Soldiers have a better idea of what to expect when they deploy. This creates a two-fold effect that provides Army Reserve Soldiers a training opportunity that greatly improves their tactical and technical skills, while simultaneously improving the infrastructure of the installation and enhancing the post's ability to train the total force for the future. This is made possible by having Operation Sand Castle units written into the rotational scenario under the watchful oversight of observer/controller-trainers (O/C-Ts). The 120th Infantry Brigade, 1st Army Division West, provided 58 O/C-Ts for the operation, helping to stage all the training events normally conducted by a BCT, to include situational training exercises and center of excellence training opportunities. The O/C-Ts coordinated for OPFOR and ran the mounted combat patrol and convoy live-fire lanes for the participating units.

Operation Sand Castle units experienced many indirect-fire attacks and civil disturbances not only at the FOB but also at the NUWC. While the units traversed the main supply routes, combat patrols were engaged by improvised explosive devices (IEDs) and vehicle-borne IEDs. Snipers attacked both the FOB and the various project sites. These key OPFOR engagements not only added to the realism of the exercise but also tested the units' battle drills and standing operating procedures (SOPs). The units are taking the lessons learned and improving their SOPs for use in-theater.

Soldiers and performers pose after the first USO show presented in "The Box" at NTC during a rotation.

The Army Reserve is not the strategic force of the past but has transformed into an operational force. The number of units participating in Operation Sand Castle has tripled since its beginnings four years ago. This year the operation had more than 54 separate units, with more than 2,500 Soldiers on the ground experiencing the best training the Army has to offer. These motivated Soldiers established an FOB that provided all life support and sustainment requirements. For example, in addition to its measure-of-training-effectiveness mission to provide level one medical care to the task force at FOB Santa Fe, medical personnel from the 328th Combat Support Hospital also trained and certified 408 Soldiers as combat lifesavers and 17 as combat lifesaver instructors.

The Operation Sand Castle task force conducted more than 55 missions, encompassing force protection, route clearance and dry-gap-crossing mobility operations, quarry operations, and vertical and horizontal construction operations. The construction effort netted more than 26,000 tons of gravel and railroad ballast used in the construction of 11 pre-engineered buildings, 14 concrete masonry unit buildings, 8,900 feet of railroad bed, and more than 10,600 feet of roads. In addition, the 655th Asphalt Detachment repaired more than 400 meters of damage to the main supply route and helped resurface two parking lots in the cantonment area.

Operation Sand Castle units also conducted 29 individual and crew-served weapons, live hand grenade and live demolitions range sessions, and 30 situational training exercise lanes that covered mounted combat patrol; convoy live-fire; medical trauma; and chemical, biological, radiological, and nuclear tasks. The Soldiers have access to a myriad of outstanding training opportunities, such as the Joint Center of Excellence for IED Defeat. More than 180 Soldiers were trained on the latest tactics, techniques, and procedures for IED defeat; electronic countermeasures; route clearance; robotics; and entry control point and escalation-of-force operations.

Another notable first was the United Service Organizations (USO) show conducted at the midpoint of the exercise by a Hollywood comedian and two Los Angeles-area bands. This was the first time that a USO show was presented in "The Box" at NTC during a rotation. The show gave the troops a few hours of downtime to regenerate as they prepared to finish their aggressive combat and construction operational tempo and replicated the FOB experience.

This year, the Army National Guard was integrated into the training. As Operation Sand Castle continues to increase in size and magnitude, there are plans to invite the other branches of the Service for joint training. The way ahead is to eventually train with armed forces from other countries in an effort to fully match conditions in-theater. The 412th Engineer Command continues to raise the bar and take training to the next level in an effort to help our Service members survive and win the War on Terrorism.

Major Brierton is the chief of operations for the 412th Engineer Command. He has been the lead action officer for Operation Sand Castle for the last two years. He has deployed to Iraq as the assistant operations and training officer and battle captain of the 983d Engineer Battalion and has commanded a light engineer equipment company. He is a graduate of the Combined Arms and Services Staff School and holds a master's in organizational management from the University of Phoenix.

Engineer Update

Engineer Crane Training. Crane accidents are one of the leading causes of death and injury in the construction industry today. These accidents are attributed to rigging failure, improper positioning, falls, dropped loads and improper outrigger use. Often, crane accidents are also the result of inadequate training and the lack of preventive maintenance, experience and supervision, and required inspections. Crane operators and supervisors must know the capability of their equipment to prevent rollovers and navigate properly to avoid striking overhead obstructions. Several documented crane accidents have occurred in the theater of operations over the past few years to include the death of a Soldier due to electrocution when a crane boom struck an overhead power line.

To address the safety and technical training needs of crane operations, the Engineer School has made changes in the way Soldiers are trained and qualified to operate the All-Terrain Crane AT422-T. Beginning in FY09, the Engineer Crane Operator Course, currently being taught as part of the 21J Course, will become an Additional Skill Identifier (ASI), coded C4. The new 3-week course is a week longer than the former course, with the first week introducing a Crane Safety block of instruction based on Occupational Safety and Health Administration (OSHA) standards. This 40-hour block of training consists of (1) Introduction, (2) Math, (3) History, Evolution, and Types of Cranes, (4) Fundamentals of Cranes and Lifting Operations, (5) Rules, Regulations, and Agencies, (6) Rigging, (7) Determine Lifting Requirements, (8) Types of Lifts, (9) Inspections and Standards, (10) Communication, and (11) Additional Safety Devices.

The new block of instruction is math-intensive and requires students to be able to complete basic and intermediate math calculations without the aid of a calculator. The remaining 80 hours of the course will consist of equipment operating time, to include (1) Introduction to AT-422-T Crane, (2) Maneuvering Operations, (3) Set-Up Procedures, (4) Procedures for Moving Various Types of Loads, (5) Clamshell Operations, and (6) Control Manipulation Practical Exercise.

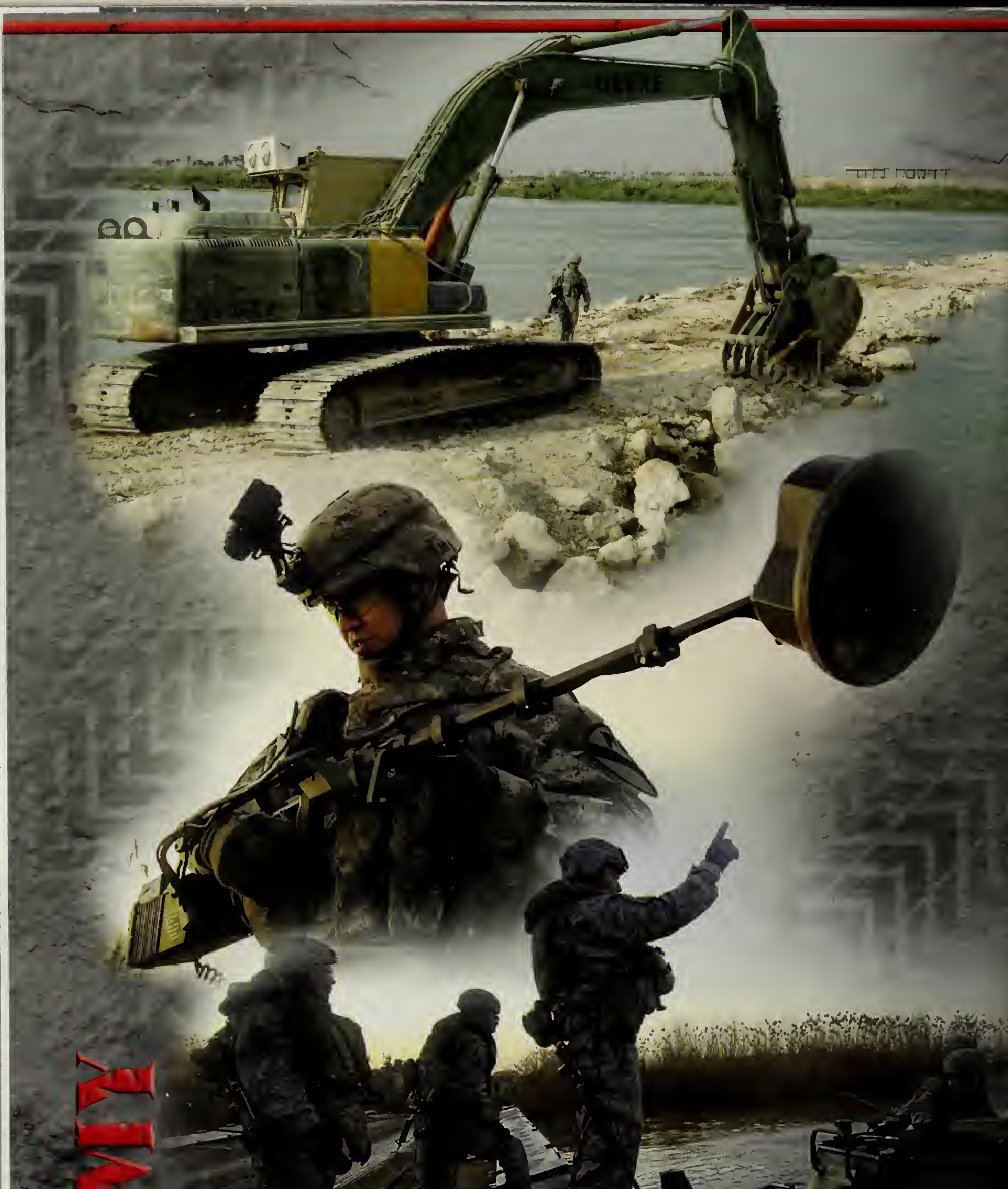
Currently, the Engineer School is working to input the C4 ASI into ATTRS for scheduling. Once courses are loaded into ATRRS, unit ATRRS managers can request seats for training. Until that time, units requiring crane operator training should contact the Fort Leonard Wood Directorate of Plans, Training, and Mobilization at (573) 563-4052. For specific questions about the course contact 1LT Vance C. Flowers at A Company, 554th Engineer Battalion, Horizontal Skills Division, at (573) 596-0131, Ext. 6-0996/7435.

News and Notes

Korea's 2009 Peninsula Engineer Conference. The Combined Forces Command (CFC) and US Forces Korea (USFK) announce the 2009 Peninsula Engineer Conference (PEC) to be held from 4 through 6 February 2009 in Seoul, South Korea. Hosted by the Society of American Military Engineers (SAME), registration will be open soon for 300 participants on a first-come, first-served basis.

This year's theme is "Transforming Korea." USFK is presenting speakers with the latest updates on Transformation to US Korea Command (USKORCOM) and the Korea Relocation Plan. The 2009 PEC will feature a tour to the site of the future USKORCOM Headquarters and "Humphreys Hub" near Pyeongtaek. Participants will view engineer updates on the USFK Theater Master Plan, KRP Construction, and Combat Engineering. The 2009 PEC will also include an Engineer Ball and other traditional military and social events.

Those interested in attending may contact Mr. Tom Brady at USFK Engineers, e-mail <*thomas.m.brady@korea.army.mil*>, or call commercial +82-2-2791-3260 (DSN 315-723-3260). For more details, see <*www.same.org/pec*>.



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UNITED STATES ARMY ENGINEER SCHOOL

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Clear The Way

By Colonel Robert A. Tipton
Commandant, United States Army Engineer School

As we once again transition leadership at the Engineer School and come together for the annual ENFORCE conference, I thought it appropriate to provide a regimental perspective on the current operational and strategic environment, as we are at a time that offers great challenge—but also great opportunity.

We all know that our Army and Regiment have changed dramatically over the past decade, but from an enduring perspective, this past year may be the most significant. With the February 2008 publishing of FM 3.0, *Operations*, our Army's capstone doctrine, stability operations are now equally as important as offensive and defensive operations. For years, tasks associated with "nation building" were to be avoided because we were designed and equipped for high-intensity operations and would only do those other tasks when we had to. From our experiences over the past decade, we know that stability operations require new capabilities and new tactical and technical competencies for engineer Soldiers. Prior to this new doctrine, most engineer Soldiers and leaders were not required to have a high level of technical skills. The Engineer Regiment has been at the tip of the spear in terms of transformation and in prosecuting full spectrum operations in two separate theaters, and we should be proud of how well we have done on both fronts under an operational design that never expected us to conduct the myriad of tasks associated with stability operations. However, experience over the past 5 years illustrates that stability operations need military engineer capabilities and skills that were not previously required, and it is important that we articulate to Army leadership how important it is to support our Regiment's efforts to continue to adapt to this new reality. I believe we have done a relatively good job of identifying how we must change and are working many initiatives to develop the Engineer Regiment we need now and for the foreseeable future. Central to this is the *Building Great Engineers* campaign, which we will again focus on during this year's ENFORCE. However, to be successful in these endeavors, we must collectively educate the Army at large on these new realities, and to do this, we must educate our own Regiment. To this end, I ask each of you to work the following three strategic messages into your conversations, writings, and briefings whenever possible:

Strategic Message #1: FM 3-0 places stability and civil support operations on equal par with offensive and defensive operations. These operations require new and significantly higher engineer technical capabilities than under previous Army doctrine, and the Army must adapt its engineer force within the context of this new doctrine.

Strategic Message #2: The current Army and engineer leader development and personnel management system is not optimized to create engineer leaders with the technical and tactical engineering skills needed for full spectrum operations. The Army needs to recognize this and support the Engineer Regiment's actions to build great engineers in order to provide the higher degree of technical capabilities our force needs, even at a time when the United States as a nation is producing fewer engineers.

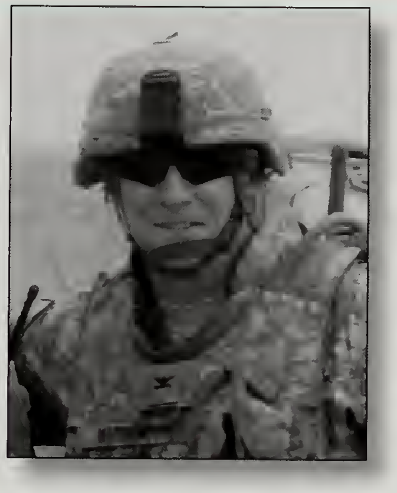
We are focused on the personnel domain, which has historically compensated for shortcomings in other domains. We will never have the exact doctrine, organization, or materiel that we need, so it is up to our Soldiers and leaders to adapt and develop solutions on the battlefield that will achieve victory. We recognize that our challenges do not reside entirely in the personnel domain. The modular force has not been fully fielded, and we must have the tactical patience to grow the complete force before we make radical judgments on its effectiveness. We must remind ourselves that the modular engineer force provides much more balanced engineer capabilities for the force at large (combat, general, geospatial), and there is universal recognition that the new modular engineer battalion headquarters is much more capable than were the legacy engineer battalions. The primary shortfall that has become clear is engineer command and control (C2)—specifically within the brigade combat team (BCT). To leverage the engineer force pool, the BCT needs a more robust engineer C2 solution. To this end, I offer the final strategic message for your use as you engage our Army leaders:

Strategic Message #3: The Army's modular BCTs will need augmentation from the engineer force pool for virtually every mission assigned, because there is not enough engineer capability within the Army to provide each BCT with the organic engineer support it will need for full spectrum operations. These high-demand engineer capabilities must be carefully managed and seamlessly moved within and between BCTs throughout any campaign. In many cases, the engineer augmentation will be large enough to allocate up to an engineer battalion to the BCT to provide C2 of these units. Short of having the organic engineer capability needed, BCTs must be trained on how to leverage and integrate engineer capabilities from the force pool to meet this gap and must have a capable and robust organic engineer staff to enable efficient engineer integration.

It has been a great privilege to serve as your Commandant during the past 6 months. The Army has made an outstanding choice in the selection of our new Commandant, COL Bryan Watson, who comes to us with the right experience and is the perfect leader to take our Regiment forward. I will continue to serve the Regiment and the new Commandant as the Assistant Commandant and look forward to seeing you at ENFORCE. Remember that we are in a period of tremendous opportunity for the Regiment! Essayons!

Clear The Way

By Colonel Bryan G. Watson
Commandant, United States Army Engineer School



Stepping into the job as the Commandant of the Engineer School and Regiment is an incredible honor…daunting when I look at the character, vision, toughness, and accomplishments of the previous Commandants, from Colonel Jonathan Williams in 1802 to Colonel Bob Tipton today—all magnificent leaders. So, you wonder, how did that happen to Watson? Well, I'm very clear about how I got to these crossroads. It was the Soldiers, noncommissioned officers (NCOs), and officers that I've had the incredible privilege of serving alongside that got me here. THEIR dedication, THEIR sense of mission, THEIR personal sacrifice, and THEIR willingness to serve…made the difference. As I step into the position as the next Commandant, know that it was your hard work—your coaching—that prepared me for this job. I'm eternally grateful and look forward to living up to your expectations with the same sense of service. My wife Kris and I are elated about returning to our Home of Engineers and serving this tremendous regimental family to our utmost…a family we have come to love as our own.

Recently, during a meeting with senior engineer leaders from across the Regiment, our Chief of Engineers, Lieutenant General Van Antwerp, made the comment that these are historic times for our world, our Nation, our Army…and our Regiment. I had to ponder that for a moment. When I think of the challenges we faced in these past years of conflict and the accomplishments of engineers in the fight, they are beyond historic. The pace of operations at the unit level as we reorganize, field new capabilities, restation, prepare to deploy, conduct full spectrum operations in multiple theaters, and reset to redeploy is…well…unprecedented. The responsibilities borne by young engineer leaders in our small units are without parallel in my career…beyond our imagination only 10 years ago. Yet, they meet the challenge with splendor. Our adaptation of doctrine and tactics, techniques, and procedures (TTP) and the rapid fielding of new equipment to meet our dynamic needs in combat is extraordinary by every measure. Finally, the steely resolve of our Soldiers to see "the Long War" through to victory…to repeatedly deploy-redeploy-deploy…to get back out on point to clear and build the way! Frankly, it leaves me in absolute awe of today's engineers.

Yes, this is a historic time for our Regiment, replete with *historic challenges* overcome by *historic acts* by *historic-caliber* engineer Soldiers and Leaders in *historic service* to their nation. But don't let your focus on our recent challenges and accomplishments obscure what should be paramount. It is the *historic opportunity* we have to shape our Regiment for the generations of engineers still to join our ranks that makes these critical times. Our responsibility is to harness today's historic experience and use it to forge our future. We must make today's history matter so we can continue to answer the call of our Army and our Nation with the engineer service it has come to expect.

The question at hand is, *Where should we focus our collective efforts into prudent actions that will guarantee our Engineer Regiment's legacy of service to the Army and Nation into the future?* In my view, there are seven key strategic tasks that must guide us as we navigate the uncertain waters that lie ahead—in priority:

- **Breed the Army's best leaders** by instilling passion for the traditions of engineer service among all ranks and inspiring them to be part of something bigger than self...without passion, this is just a job.
- **Be clear in our purpose:** We exist to provide the full spectrum of engineer capabilities needed to **assure the movement, maneuver, protection, and freedom of action of the force** from theater to tactical-level operations. It drives everything we do; it must guide our priorities.
- **Build Great Engineers through lifelong development opportunities** for officers and noncommissioned officers to ensure that our formations have the technical skills, operational savvy, and physical/mental stamina to continue our heritage of expert service to the Nation in battle or peace.
- **Constantly improve the Regiment's stance at the line of scrimmage** so we can rapidly respond to the commander's audible with the full spectrum of engineer capabilities...and be ready for tomorrow's battle.
- **Extend our view of the engineer team** beyond our regimental formations in all components, to include our sister Services and industry partners; learn to leverage and complement their capabilities.
- **Take immense pride in our Regiment,** never forgetting our purpose to support the force first…**serving as engineers with the heart of a sapper!**

In my estimate, these strategic key tasks are imperatives for the future. Some we do extremely well now, while others represent recent initiatives already underway. We must sustain those efforts! But the list also describes new territory that I believe is vitally important to ensure that we provide commanders with the engineer force they require in future conflicts. They must guide our way ahead and the tough decisions we will face. Overall, they support my personal vision for our Engineer Regiment:

(continued on page 62)

Lead The Way

By Command Sergeant Major Robert J. Wells
United States Army Engineer School

As you know, the Army has announced that this year is "The Year of the NCO," and I'd like to address the Sergeants in our formation. This article is devoted to those great NCOs who taught me how to be a good Soldier and Sergeant and a decent human being.

What I've learned from my Sergeants has had a lasting impression. Without my knowing it, they've dictated the way I train and care for my own Soldiers and their Families. Being an NCO is harder today than it was 10 years ago. A 12- or 15-month deployment leaves you exhausted, physically and mentally. Period. No matter how you slice it, this stuff is hard. The stress of combat, accomplishing the mission, and taking care of Soldiers made me realize that there's a lot of hard work that needs to happen back in garrison to minimize the number of Soldiers wounded in combat. I know the enemy has a say in every engagement, but it's the way my NCOs reacted during those engagements that's carried the day for our unit. And to build a great team, it takes some hard thinking, detailed planning, and solid execution once we start training at R+91.

My NCOs have taught me the value of acting on those hard lessons learned from the last deployment and from our brothers and sisters who are deployed now. I don't have all the answers, but there's a bunch of NCOs in my company who can help me figure this stuff out.

My Sergeant told me that he can't give me his full, undivided attention back in the rear like he did when we were deployed. He has a family that hasn't seen him these past 15 months, and they'd like to get to know their father. That doesn't mean he's going to completely ignore me, but it does mean that I have to behave myself, especially when my Sergeant's not around. He told me I should act like a decent human being. I had no idea what he was talking about, and I asked for clarification. So he sat the entire team down and gave us his philosophy on decency.

He said, "There are usually three things that get Soldiers in trouble—money, women, and compulsive behavior."

"Money is a powerful aphrodisiac, and right now your pocket is burning to spend as much of it as possible, but you've got to have patience. Remember how we took down that IED cell a few months back? It took us about 3 months to do it, but it was worth the effort. We took our time, gathered the intel, developed a plan, and executed it with no collateral damage. Everyone was happy, except the bad guys. Same goes for money. You've got this strong urge to go out and shoot (spend) anything that moves, but in the end you'll just create a lot of collateral damage, a debt you can't manage on your now-taxable private's pay, and everyone's gonna be mad at you, except the bad guys."

"Formal courtesy between a man and a woman is more important than it is between strangers. Never embarrass or tease your girlfriend in front of your buddies or in private. When you're out on the town, your first meeting engagement should be just like we do key leader engagements in-theater. Slow is smooth, and smooth is fast. Do your homework, get to know your subject, and slowly develop a good relationship based on honesty and trust. We don't take advantage of the Sheik's good nature and start putting our own plan into action without his consent. Same goes for a woman. You may think she's flirting with you, but really she's just being nice and conducting her own recon. You'll know you're doing things right if the happiness of your wife or girlfriend is essential to your own happiness. One last thing, you are never authorized to push around or hit a woman. No matter what she says or how drunk or how stupid you get. You can expect the full attention of the entire chain of command, from team leader to battalion commander, if you do."

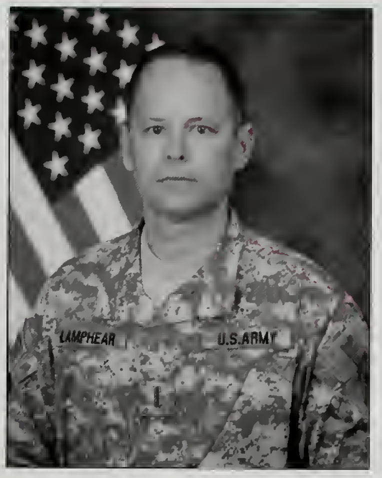
"Being compulsive means that you're obsessed about one particular thing, and you just take it too far. Being a 'Barracks Rat,' sitting in front of a TV playing video games all weekend is one example. Drinking alcohol to excess is another example. Watching civilians on MTV or the Internet, going to the mall and outfitting your entire wardrobe with clothes that look more like costumes than anything else is another. Putting large plugs in your ears so it looks like you've got two little butts growing out of your earlobes…tattoos…piercings…and the list goes on and on. The object is to not lose your perspective. Just because you're in a combat zone doesn't mean that stuff like hygiene, courtesy to officers, uniform standards, maintenance, awards, reports, and ceremonies stop until we redeploy, now does it? It's the reason we don't keep you on the same equipment for the entire rotation. You'll reach tracer burnout, and it could get you or someone else hurt. Same theory applies back in the rear. You've got to have a wide variety of interests and spread your time out for your Family, your battle buddies, and your duties as a Soldier so you don't burn out on us. You are expected to maintain our standards of uniform, punctuality, weapons, equipment, and good behavior no matter where you are."

Thank you, Sergeant Barajas, lesson learned. I continue to be amazed by what our Sergeants are required to do—in combat and in garrison. It's our duty to ensure that they not only have all the tools in their kit bag to be a successful Sergeant but also to help them sort out their kit bag and train them on how to best use those tools.

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer

As the third Regimental Chief Warrant Officer (RCWO), I am thrilled to join the Engineer School Commandant and the Regimental Command Sergeant Major in communicating with our great Regiment's Soldiers through the *Engineer Professional Bulletin.* What a great opportunity to inform and educate our engineer force about regimental and Army warrant officer issues. I'll use this venue to keep you updated on all things warrant officer in the areas of doctrine, organization, training, materiel, leadership and education, personnel, and facilities – the DOTMLPF domains.



The RCWO position was established as a result of the recommendation of the Chief of Staff, Army-chartered Army Training and Leader Development Panel (ATLDP) Phase III – Warrant Officer Study, published on 18 July 2002. The panel met to examine and make recommendations on the training and leader development of the Army's Warrant Officer Corps. The panel made 63 recommendations, grouped into four major categories: Army Culture, Training and Education, Manning, and Professional Development. One recommendation was to establish and resource a Chief Warrant Officer of the Branch position at proponent centers and schools where they did not currently exist. The RCWO's primary duties are as follows:

- Serve as the principal advisor to the Commandant on all matters pertaining to engineer warrant officers.
- Serve as a voting member of the Vice Chief of Staff, Army-chartered Senior Warrant Officer Advisory Council (SWOAC). The council provides Department of the Army (DA)-level integration and synchronization and advice to the Army leadership for career field-related issues.
- Act as the single regimental point of contact for engineer warrant officer issues and primary advocate/liaison for engineer warrant officer training/leader development issues.
- Assess, monitor, and solve problems related to training, professional development, morale, recruiting, retention, and readiness.
- Manage the engineer warrant officer recruiting program; evaluate accession packets for the Active Army, Army National Guard (ARNG), and United States Army Reserve (USAR).
- Develop and write the Regiment's position for warrant officer accessions, training, and professional development issues.

The Regiment has two warrant officer areas of concentration (AOCs)—utilities operation and maintenance technician (210A) and geospatial information technician (215D). With modularity nearly tripling the number of 210A positions and FM 3-0, *Operations*, placing stability and civil support operations on equal par with offensive and defensive operations, the 210A will play an increasingly important role in providing construction expertise and support to the Regiment, Army, and nation. The 210A can now be found in vertical construction platoons, survey and design detachments, prime power platoons, engineer brigades, maneuver enhancement brigades, combat support hospitals, division and corps headquarters, and the White House.

The 215Ds play a vital role in coordinating and supervising the collection, production, analysis, interpretation, and processing of geospatial information for the combatant commander. The Force Development Update (FDU) to add geospatial warrant officers to all brigade combat teams (BCTs), if approved, will nearly double the number of 215D positions within the Regiment. The 215Ds can be found in BCTs, division and corps geospatial teams, topographic companies, geospatial planning cells, and joint (COCOM) assignments. The growth in engineer warrant officers has created a great opportunity for noncommissioned officers to apply for the warrant officer program. Calendar year 2008 was the Regiment's best recruiting year ever as we approved and/or accessed 75 Active Army, ARNG, and USAR Soldiers to be engineer warrant officers. For information on becoming an engineer warrant officer, log onto the Army recruiting website at <*http://www.usarec.army.mil/hq/warrant* >.

The growth in engineer warrant officers is also changing how we train both our 210As and 215Ds. The Engineer School's Department of Training and Leader Development is in the midst of a comprehensive analysis of the 210A Basic Course which, when completed, will significantly improve the quality and breadth of technical training. The 215D Basic Course has already expanded to meet the changing requirements of the Army's geospatial community. I will detail the Warrant Officer Education System in the next issue of the *Engineer Professional Bulletin.*

This year's ENFORCE will feature the first Council of Engineer Warrant Officers and recognition of the Warrant Officers of the Year for the USAR and Active Army. The Council format will provide for a comprehensive warrant officer update for attendees and allow them to participate in the discussion of issues that will affect engineer warrant officers. Come join us!

In closing, this IS the best time in our Regiment's history to be an engineer warrant officer. As your RCWO, I will strive to keep you informed through this publication and other avenues as appropriate. For those of you in harm's way, stay safe and continue to do the fantastic work that is keeping this country safe. Essayons!

Moving Out With Great Engineers

By Lieutenant General Robert L. Van Antwerp

Our historic workload both here and abroad—plus the addition of "The American Recovery and Investment Act (Stimulus)"—focuses us on having *Great Engineers* with the requisite competencies to "get 'er done." Our Soldiers and Civilians are working in 33 countries providing full spectrum engineering services—from sapper and construction engineering in combat to water resource planning and construction on our river systems to geospatial engineering to disaster recovery and reconstruction.

The Chairman of the Joint Chiefs of Staff, Admiral Mike Mullen, has recognized the need for developing and growing great leaders and engineers. He demonstrated this requirement when he published his new doctrinal guidance on how our future force must function and the capabilities it needs to possess.

Our engineers must be able to serve an array of customers in a diverse set of circumstances, from partnering with local tribal leaders to designing a sluice gate on a levee to building a bridge across a river in Iraq. Our engineer force must be able to synchronize individual talents and overall effects in order to offer a full suite of engineering skills. It will take Great Engineers to accomplish these important missions.

As Admiral Mullen states, "Leaders down to the lowest levels must be comfortable acting on their own authority based on an understanding of the larger situation and an appreciation for the broader implications of their actions..." That puts a premium on competency!

We have a significant mission ahead. What a great time to be an ENGINEER!

Lieutenant General Van Antwerp is the 52d Chief of Engineers and Commander of the United States Army Corps of Engineers.

Bassett Army Community Hospital in Fort Wainwright, Alaska, is a modern $215 million medical facility built by the Corps's Alaska District. This 259,500-square-foot medical building replaced a hospital built before Alaska became a state. The construction and modernization of quality-of-life facilities such as this represent the many engineering services that our Nation, our Soldiers, and their Families depend on each day.

Lay Hold! Heave!

Building Speed: Excitement and Satisfaction in Pushing the BGE Flywheel

Compiled by Colonel Jerry C. Meyer from information provided by past and present members of the Building Great Engineers (BGE) Council of Colonels: Colonel William H. Haight, Colonel Timothy O'Rourke, Colonel James Wong, Colonel Janice Dombi, Mr. Steven H. Tupper, Colonel Robert A. Tipton, Colonel Jose Cepeda, Colonel Andrew Phillips, and Dr. Robert Wolff

". . . why does the Flywheel Effect work? Because more than anything else, real people . . . want to be part of a winning team. They want to contribute to producing real results. They want to feel the excitement and the satisfaction of being part of something that just flat-out works. When people begin to feel the magic of momentum—when they begin to see tangible results and can feel the flywheel start to build speed—that's when they line up, throw their shoulders to the wheel, and push."—Jim C. Collins[1]

Background

Seeking to reverse quantifiable degradation to engineer leader technical and tactical competency, the Fort Leonard Wood portion of ENFORCE 2008 built on the foundation of six Engineer Leader Technical Competency (ELTC) work groups:

- Future Roles, Missions, Delivery Methods
- Accessions
- Training and Education
- Employment
- Retention
- Strategic Communications

Less than 60 days later, the result was a Chief of Engineers-approved *Building Great Engineers* Campaign Plan with nearly 40 initiatives. For those with Army Knowledge Online (AKO) access, that plan can be read on the Engineer School Knowledge Network (ESKN).

Seven months later (as of this 1 March writing), what has become of the efforts of those who have remained engaged and put shoulder to the flywheel? Too often "good ideas" languish and die from lack of follow-up and effort. Did we really begin doing what we said we were going to do? Is the flywheel turning? The intent of this article is to inform the Engineer Regiment on the current status of many BGE actions initiated by the plan and the way ahead in increasing engineer leader technical and tactical competency for full spectrum operations in an era of persistent conflict.

"Don't wait until everything is just right. It will never be perfect. There will always be challenges, obstacles and less than perfect conditions. So what. Get started now. With each step you take, you will grow stronger and stronger, more and more skilled, more and more self-confident, and more and more successful."—Mark Victor Hansen

First, a salute to the leaders who provided great value and now have moved on to other duties! These include Major General Gregg F. Martin, Colonel William H. Haight, Colonel Everett McDaniel, and Colonel James Wong. The power of these leaders' mighty shoulders overcame the inertia of rest on our great wheel!

Next, there are signature accomplishments on each spoke. For the ***Futures*** work group, the force structure in corps and division staffs is being addressed to improve engineer expertise, and we now see the return of military personnel to public works in the foreseeable future. ***Accessions*** has stirred up a significant review of how the Army runs the business of bringing in new lieutenants and leveraging their academic backgrounds. ***Training and Education*** has pushed a suite of teaching and curriculum improvements inside the United States Army Engineer School. ***Employment*** has redrafted the description of an engineer's career in Department of the Army (DA) Pamphlet (Pam) 600-3, *Commissioned Officer Professional Development and Career Management,* thus setting a modern paradigm for a new generation of sappers, builders, and geospatial engineers. ***Retention*** is on the verge of reimbursement of Professional Engineer (PE) exams and preparation fees. ***Strategic Communications*** has developed DA-level marketing materials that are making a difference.

Finally, you are invited to review the following detailed summaries and to attend the work sessions at ENFORCE 2009 that will push this critical work forward.

Future Roles, Missions, Delivery Methods

Work group leadership has been passed to Colonel Timothy O'Rourke and Lieutenant Colonel Vernie Reichling, Office of the Chief of Engineers–Pentagon (OCE–P). The work group founder, Colonel William H. Haight, has moved to the Joint Staff and still remains engaged.

Progress

Engineer Staff Structure in the Brigade Combat Team, Division, Corps, and Army Service Component Command. To date, the Vice Chief of Staff, Army (VCSA) has approved the force structure for the corps and division staffs; there were no significant changes for engineers. The Army is conducting a holistic review of the brigade combat team (BCT) structures. Currently, one 215D/W2 is an addition, and there is a reduction of one 21B/03 in the heavy brigade combat team (HBCT)/infantry brigade combat team (IBCT).

Gaining Support in the Joint Operational Engineer Board for Capacity Development. The new capstone concepts for joint operations, the joint operational environment, and the joint operational concepts include capacity development. The Joint Engineer Capabilities-Based Assessment will address the needs of capacity development across the engineer components of the Services.

Coordination With Other Centers/Branches to Better Synchronize Shared Missions With the Intent to Eliminate Redundancy/Increase Synergy. Efforts have largely centered on stability operations. The Base Camp Integrative Capability Development Team continues to move toward a capabilities-based assessment, and recently the Assistant Chief of Staff for Installation Management (ACSIM) presented a concept to the VCSA on expeditionary base camps; however, it falls short of addressing the strategic issue of defining policy for expeditionary basing. Additionally, we are engaging with the United States Army Civil Affairs and Psychological Operations Command on developing doctrinal concepts for engineer support to their operations with a goal of formalizing this relationship for the Regiment.

Development of a Force Design Update for a Strategic-Level Engineer Brigade. This is on hold due to the Army being overstructured. It is unlikely that this structure will be addressed until after the release of the new administration's *National Defense Strategy*. The Engineer School is determining the feasibility of this requirement.

Return of the Director of Public Works (DPW). The Installation Management Command (IMCOM) initiative and support for this is pending approval in Total Army Analysis (TAA) for FY2010-2015, but it is an unresourced requirement. These positions will have to be readdressed in TAA for FY2012-2017. Additionally, the engineer chapter in DA Pam 600-3 was submitted reflecting the BGE concepts and career paths.

Way Ahead

The United States Army Maneuver Support Center (MANSCEN) continues to provide input to the BCT holistic review. Members of the Futures work group will continue to define capacity development as a task in the Joint Capabilities-Based Analysis and Engineer Brigade Headquarters DOTMLPF Study. We will continue to engage the United States Special Operations Command on civil affairs doctrine and engineer support. The Engineer School will work on determining feasibility of developing a Force Design Update for the strategic engineer brigade. We will continue to readdress resourcing DPW requirements in TAA 12-17, per the above update.

"You don't make progress by standing on the sidelines, whimpering and complaining. You make progress by implementing ideas."— Shirley Hufsteddler

Accessions

Colonel Janice Dombi, who recently assumed command of the United States Army Corps of Engineers (USACE) South Pacific Division, heads this work group, which was previously chaired by Colonel Everett McDaniel and Colonel James Wong.

Progress

Access More Degreed Engineers. Results from attempting to access more degreed engineers into the branch are in. Despite a concerted effort at Warrior Forge, Reserve Officer Training Corps (ROTC) branch selection resulted in only

29 percent of officers with engineering degrees being accessed into the Engineer Branch. This is down from 35 percent degreed engineers with the class of 2008, in which little effort was expended to recruit degreed engineers into the branch. Twenty-nine cadets with engineering majors had engineer as their first branch preference, yet did not receive the Engineer Branch. Popularity of the branch went from 7th to 5th, mostly on the 50 percent rise of nonengineers who wanted the branch as their first choice. Among degreed engineers, first choice selection rose by about 10 percent. Had it been specified by Army regulation (AR), the branch could have had 30 to 40 percent more accessed officers with engineering degrees. One-third of those who branched engineer had a degree in political science, criminal justice, history, international relations, or psychology. As a result of these findings, United States Army Cadet Command is now willing to explore branching degreed engineers to lessen the effect of the order of merit listing in the process (not only for engineer, but also other degrees/branches).

For the combined classes of 2009 that were accessed from the United States Military Academy (USMA) and ROTC, 41 percent had engineering degrees (USMA had about 58 percent degreed engineers in the class of 2009, while having well over 60 percent from the class of 2008). If all degreed engineers who selected the Engineer Branch as first choice had been allowed to branch engineers, almost 53 percent of the total USMA and ROTC class would have had engineering degrees.

Officer Candidate School (OCS) classes with an engineer captain leader appear to have higher selection rates for the branch. In 2009, 50 percent of engineer degreed Soldiers selected the Engineer Branch.

Professors of Military Science at Engineer-Centric ROTC Schools. The United States Accessions Command held a summit to talk to Professors of Military Science (PMSs) at engineer-centric ROTC schools to promote engineering. There appears to be a correlation between the branch of the overseeing PMS at the college and branches chosen by the ROTC cadets ("be like me" syndrome). Colonel Dombi has requested feedback from this summit.

Way Ahead

Changing AR 600-3, *The Army Personnel Proponent System,* will have significant impact on determining the number of engineer-degreed cadets branching engineer. Colonel Dombi will lead a breakout group during ENFORCE on broadening an "adopt an engineer" program.

"The great thing in the world is not so much where we stand, as in what direction we are moving."— Oliver Wendell Holmes

Training and Education

Colonel Jerry Meyer, Engineer School Director of Training and Leader Development, and Mr. Steven Tupper, Missouri University of Science and Technology (Missouri S&T), continue to head this work group.

Progress

The Training and Education work group has made solid progress, albeit mostly internal to the Engineer School, for changing courses and improving instruction.

Improving Engineer School Instructors. In consonance with improving Engineer School instructors, the School has implemented a mandatory interview process in addition to the formalized instructor criteria provided to Human Resources Command (HRC) several months ago. Approximately eight Engineer School instructors are participating in the USMA Master Teacher Certification Program, after a visit by Dr. Mark Evans from West Point's Center for Teaching Excellence. Instructors are already halfway through their first year of the program, learning to be better in their primary mission. Several instructors also completed a speed-reading course for college credit via the University of Central Missouri.

Maximizing Learning Effectiveness Within the Existing Training Infrastructure. The Engineer Basic Officer Leader Course (BOLC) has been aligned with FM 3.0, *Operations.* In response to overseas unit requests, more than 300 officers, warrant officers, and noncommissioned officers (NCOs) have received 20 hours of contracting officer's representative (COR) training via Defense Acquisition University online training. Environmental officer certification is now being requested as course growth for BOLC, Engineer Captains Career Course (ECCC), and 210A Warrant Officer Course. The Society of American Military Engineers (SAME) and the University of North Dakota are in the process of signing an agreement giving Soldiers an opportunity to earn an ABET (formerly Accreditation Board for Engineering and Technology)-accredited bachelor of science degree in engineering online (some lab time required). (See the Strategic Communications work group's progress on page 12.) In February 2009, the Engineer School Department of Instruction invited the International Committee of the Red Cross to speak to the ECCC. The ECCC partnered with academia (Missouri S&T), SAME, and the Missouri State Emergency Management Agency (SEMA) to conduct Structural Assessment Visual Evaluation (SAVE) training, not only to make officers available for state disaster assistance during their student time but also to hone wartime damage assessment skills. Media training, in partnership with journalism students from the renowned University of Missouri (Columbia) School of Journalism, was so successful that it is being developed for use across the United States Army Military Police School and the United States Army Chemical, Biological, Radiological, and Nuclear (CBRN) School. Captains are taught principles of dealing with the media and are videotaped in scenario-driven interviews for peer analysis.

Improvements in Engineer School Methods of Instruction. Testing out/validation of instruction continues to be developed. Experimentation to test out student officers and offer more advanced substitute courses has revealed a student reluctance to attempt validation and a need to formalize and grow alternative subjects, should students "validate" normal course offerings. Additionally, Dr. Brock Barry, Purdue

University, and soon-to-be USMA civil engineering professor, spent a few days at the Engineer School, made recommendations for classroom improvement, and began forging a closer relationship for a USMA–Engineer School partnership. Captain–lieutenant mentorship/integration began where feasible between ECCC and BOLC students. For example, students who are lieutenants must receive a company operations order (OPORD) given by a captain who is being graded by a senior evaluator, and lieutenants must subsequently write a platoon OPORD for evaluation. Additional hands-on activities and integration across the BOLC–ECCC–NCO–warrant officer courses have occurred via tactical exercises without troops (TEWTs).

Technology in the Classroom. Use of technology in the classroom continues to progress. DARWARS Ambush! route clearance simulation training within BOLC and the Advanced Noncommissioned Officer Course (ANCOC) collaboration has been very useful and continues to expand and improve. The "Think Like a Commander" United States Army Training and Doctrine Command (TRADOC) leadership simulation was not as useful as hoped. "Turnitin®" is being used to assist students with writing assignment documentation and as a bulwark against occasional plagiarism. Tablet personal computers (PCs) have been purchased for one ECCC small group, and the second pilot of use of the Tablet PC and e-books is underway. The first pilot experienced organizational and technical challenges. Piloting has been completed and a purchase of Classroom Response Systems (CRS) is underway for BOLC. CRS is a software environment for developing and administering questions via PowerPoint®. Students input their answers using wireless devices, and a receiver connected to the instructor's computer tabulates the results for immediate feedback that is visible to all. Although uses of the system are numerous, this system particularly enhances interactive, student-centered learning by real-time compilation of student responses to checks on learning via wireless technology. Feedback to students and instructors allows for more efficient and effective learning.

Warrant Officer 210A Course. This course has been redesigned, with much more emphasis on technical competency and certification. Course growth from 12 to 26 weeks is now being worked through the TRADOC course development process.

Civilian Education Options. The civilian education options for the Regiment are still largely the cooperative degree program with Missouri S&T. The ECCC Reserve Component students now have an avenue to achieve an engineering master's degree, and a follow-on doctoral program has been publicized by Missouri S&T. A series of new, online ABET-accredited engineering degrees via the University of North Dakota is explained in the Strategic Communications work group progress.

Way Ahead

Most of the effort during the past several months has been internal to the Engineer School. External partnership needs to be reinvigorated. This emphasis will include multi-Service and joint training, officer exchanges, and concepts like the Joint Engineer Training Center of Excellence. Partnership with the USACE courses and joint, interagency, intergovernmental, and multinational (JIIM) educational opportunities are needed. Since the various Service chief engineers are scheduled to speak at ENFORCE 2009, rejuvenation of these partnerships is a goal.

A memorandum formalizing Engineer School participation in the USMA Master Teacher Certification Program will be written. The Engineer School Directorate of Training and Leader Development will investigate establishment of a funded graduate degree program with follow-on assignment to the School. It will also develop an instructor recruitment program from higher-performing ECCC graduates. The Engineer School is also exploring the possibility for general officer (Engineer School Commandant) senior rating of School officer instructors. Increased leveraging of TRADOC's Learning Services Division video teleconference training will also improve instructor competence.

The Engineer School Department of Instruction should soon complete planning for and execution of the Captains Career Course common-core redesign, as mandated by the new TRADOC Commanding General. How or if this initiative supports BGE is yet to be determined.

The ability of students to get an ABET-accredited engineering bachelor of science degree from SAME-brokered partnership with University of North Dakota will require Regiment-wide promotion.

Impacts and implementation of a new Noncommissioned Officer Education System (NCOES) will be determined over the course of the next several months.

"Human progress is neither automatic nor inevitable. . . Every step toward the goal . . . requires sacrifice, suffering, and struggle; the tireless exertions and passionate concern of dedicated individuals." — Dr. Martin Luther King, Jr.

Employment

Colonel Jose Cepeda, Engineer School Deputy Assistant Commandant for the Reserve Component, assumed leadership of the Employment work group when Colonel Robert Tipton assumed the duties of Engineer School Commandant late last fall.

Progress

"Green Pages" is a personnel tool designed to display an individual's talents, experience, and most desired assignments beyond current capabilities. Rather than contracting this initiative, AKO has begun improving the "My Profile" section, which will become the foundation of the Green Pages. Supplied with this additional data, HRC will be better informed in selecting the most qualified individuals for available positions or for consultation or reachback support.

DA Pam 600-3. The Engineer School submitted a final draft of DA Pam 600-3, Chapter 14, Engineer Branch career paths, near the end of December 2008. The new manual, which is to be published in the spring/summer of 2009, is out for DA-level staffing. The rewrite reflects a theme of continuous education and broadening both inside and outside of positions within the Engineer Branch. The objective is to promote the pursuit of education and certification throughout an officer's career and identify both key and developmental positions for each rank that broaden an officer's knowledge of all facets of engineer operations, to include geospatial, USACE, facilities, combat, construction, and maneuver support. When combined with a quality senior mentorship and training program, this manual will provide a road map to producing high-quality engineer officers for our Regiment. A special team will be formed to analyze at least three courses of action, study potential impact on the Regiment, and make recommendations at ENFORCE 2009.

Way Ahead

Further definition, scope, and boundaries are needed for Green Pages, as well as talent-matching rules. A pilot program of its use will follow. There will be continued collaboration among the Engineer School, DA G1, G6, AKO, and HRC.

A major breakout group session for ENFORCE will address engineer military occupational specialty (MOS) and skill identifier (SI) considerations, as well as professional requirements and certifications. This ENFORCE breakout group will be led by Lieutenant Colonel Keith Dupont. The issue is whether to create two or more specialized officer area of concentration (AOC) codes within the Engineer Branch and manage our officers according to the AOCs. While the current DA Pam 611-21, *Military Occupational Classification and Structure,* lists 21A, 21B, and 21D as separate and distinct AOCs, DA Pam 600-3 doesn't address the differences, and Engineer Branch and the Army aren't really managing our officer population by separate AOCs. This will be a major focus topic for this year's *Building Great Engineers II* ENFORCE Conference. The courses of action (COAs) are as follows:

- *COA 1: Develop Additional Areas of Concentration.* AOCs create "minibranches" within the Engineer Branch. Officers will be accessed into each AOC based on their educational background and experience, instead of requiring that all officers fulfill all duty positions. By being grouped into concentrations, officers will experience similar positions during their career. This will incrementally develop officers' abilities and ensure that those competencies are not lost by misaligned position requirements and personnel capabilities.
- *COA 2: Develop Skill Identifiers.* SIs identify duty positions that require individuals with specific skills. Officers are not required to fill a position with which they share a skill code; however, personnel managers are able to quickly identify qualified personnel for specialized positions during the assignment process. Because SIs are coded in the modified table of organization and equipment (MTOE), the training that individuals need to fill those positions is funded by DA.
- *COA 3: Increase the Number of Project Development Skill Identifiers.* Project development skill identifiers (PDSIs) are codes given to personnel based on specific experiences or training they have received. PDSIs allow assignment officers to quickly identify personnel with specific backgrounds. Because PDSIs are not coded in the MTOE, there is no forcing function to provide training; however, they allow the branch to better employ officers with specific skills and experiences.

There is a need to continue studying existing HRC policies and practices and identify which must be changed.

Another employment-related breakout group at ENFORCE 2009 will determine how to best get engineers into short-term USACE/DPW positions and establish a "partnership program" to link USACE/DPW with field units. This breakout session will be led by Colonel Janice Dombi.

The Regimental Command Sergeant Major will be working BGE issues in support of NCOs.

"Progress always involves risk; you can't steal second base and keep your foot on first base."—Frederick Wilcox

Retention

Colonel Andrew Phillips, the United Kingdom MANSCEN Liaison, continues to lead the Retention work group of BGE.

Progress

Reimbursement of Fees. The reimbursement of fees associated with PE license renewal and for gaining a PE license for the first time, regardless of the current position held by the applicant, was investigated. A proposal to gain authorized delegation for USACE/Engineer School to fund this initiative has been submitted to the Office of the Secretary of Defense (OSD), and a decision is expected soon. If successful, a policy letter will be issued. In parallel, details of other potential sources of funding for PE licensing (such as tuition assistance and the GI Bill) will be publicized Regimentwide as part of the strategic communications plan.

Branch Mentorship. Branch mentorship for junior engineer officers employed outside an engineer chain of command is a complex issue that will be examined in more detail by a breakout group at ENFORCE 2009.

Transportability Between the Regular Army and Reserve Component. The issue of transportability between these components in order to improve retention is an issue that is being examined Armywide by Headquarters, DA, and progress is being monitored to identify any targets of opportunity for the Engineer Branch.

Way Ahead

A plan for leading an ENFORCE 2009 breakout group on branch mentorship for junior engineer officers employed outside an engineer chain of command has been drafted. If this is an area of interest to you, plan to join the breakout session.

We continue to monitor progress of the Continuum of Service Opportunity initiative to remain abreast of progress and identify targets of opportunity for the Engineer Branch.

"He who cannot change the very fabric of his thought will never be able to change reality, and will never, therefore, make any progress." — Anwar Sadat

Strategic Communications

Dr. Robert Wolff, Executive Director, Society of American Military Engineers (SAME), is the work group lead.

Progress

Marketing Brochure. An Army Engineer Regiment (AER) marketing brochure was printed and distributed via United States Army Cadet Command and USACE districts. It has since been revised to correct some missing units. A brochure is being reprinted for wider distribution.

AKO/Engineer School Websites. An AER briefing, posters, and frequently asked questions (FAQs) were provided on AKO and Engineer School websites.

Visit Engineering Schools/ROTC Units. USACE implemented an initiative to visit engineering schools and ROTC units to market AER.

DA-Level Marketing Opportunities. The work group obtained a DA point of contact for the McCann Erickson contract and intends to follow up to ascertain DA-level marketing opportunities.

Online Engineering Degrees. SAME negotiated with the University of North Dakota (UND) regarding online engineering degrees. When the memorandum of agreement is signed and implemented, UND will offer undergraduate ABET-accredited online degrees in chemical, civil, mechanical, and electrical engineering. UND will possibly add petroleum engineering in the near future. These degrees require at least 125 (semester) credits to be obtained in an estimated six-year period, predicated on an individual taking two courses per semester. The completion time will be shorter if an individual is awarded credits for experience in an engineering field or has undergraduate credits that can be transferred to the UND degree program. The only resident requirement is for approximately five weeks of laboratories at UND (the number of weeks/visits to UND may differ depending on labs that students have already taken at another college/university) or other location sponsored by SAME and approved by UND. UND assists in the arrangement of inexpensive housing for students while they are attending these resident programs. It is anticipated that most of the cost will fall under current tuition assistance available to military personnel.

Way Ahead

The work group will continue to support the communications needs of the *Building Great Engineers* Campaign Plan and other BGE work groups. Signing and implementation of the SAME–UND memorandum of agreement is expected very soon. The work group will continue to update and improve the package of documents that is now on the Engineer School public website for use in talking to high school and college students about the opportunities for a career (military and civilian) in the Engineer Regiment.

We need to develop a concept and cost estimate for an 8- to 10-minute video that can describe the elements of the AER for use in recruiting and upload it to the regimental websites and YouTube. Social networking is next among our targets.

In the near future, we intend to identify points of contact who can best represent the career opportunities in the United States Army Reserves, Army National Guard, USACE, and IMCOM for officers leaving active duty early in their careers.

Conclusion

With measurable progress across all BGE work groups, major progress occurred with SAME's establishment of online ABET-accredited engineering degrees via the University of North Dakota; rewrite of DA Pam 600-3, Chapter 14, Engineer Branch career paths; initial decisions and development of Green Pages via AKO; numerous Engineer School internal training and education initiatives; and development of strategic communications media for use by all members of the Regiment.

Five BGE breakout work groups have been identified for ENFORCE 2009. Most profound will be the work regarding which course of action to pursue in commissioned officer professional development and career management (generalization versus specialization). This is a significant milestone and will guide future progress for many initiatives across several BGE work groups.

Several unsung heroes of the Engineer Regiment, unmentioned here, have shouldered the load in making the first push of the flywheel. They have experienced the excitement and satisfaction of making a lasting, positive, significant difference for the Regiment.

"It behooves every man to remember that the work of the critic is of altogether secondary importance and that, in the end, progress is accomplished by the man who does things."—Theodore Roosevelt

Where's your shoulder? Lay hold! Heave!

Endnote

[1] Jim C. Collins, *Good to Great,* Harper Business, New York, 2001.

A QUICK LOOK ACROSS THE DOTMLPF DOMAINS

By Colonel James R. Rowan (Retired)

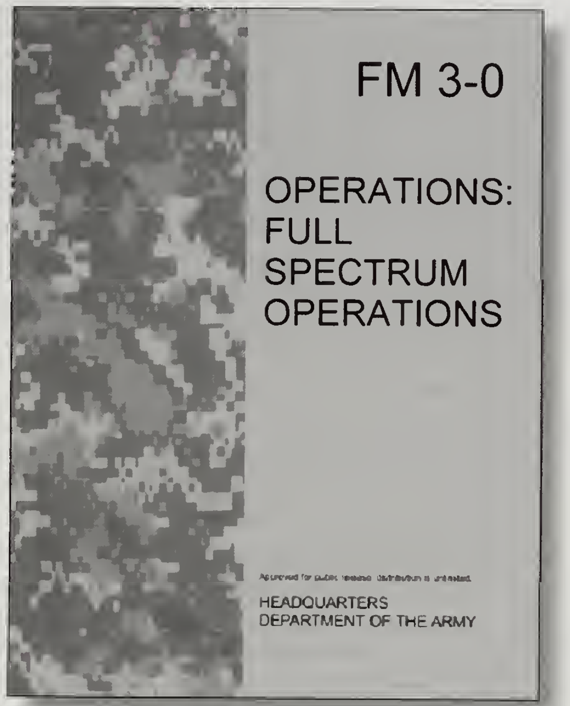
There are several actions ongoing at the United States Army Engineer School and the United States Army Maneuver Support Center (MANSCEN) directorates at Fort Leonard Wood, Missouri. Although there are too many to discuss in a single article, this one will identify one or two areas in each of the key domains—doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). If you haven't already done so, it's probably best to go back to the two "Clear the Way" articles at the front of this bulletin. Colonel Tipton's column highlights the strategic messages for the Regiment and Colonel Watson's column provides the commandant's vision and philosophy. Reading these two short articles first is necessary to put the DOTMLPF actions in the right perspective.

Doctrine

Our keystone field manual (FM) 3-34, *Engineer Operations*, has been approved and will be online shortly at the Reimer Digital Library. All engineer leaders should read the manual and understand how the Regiment is designed to operate within the modular force. FM 3-34.22, *Engineer Operations–Brigade Combat Team and Below*, can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*>. Also due out soon is our other new organizational manual, FM 3-34.23, *Engineer Operations–Echelons Above Brigade Combat Team*. Both of these manuals have had all the necessary reviews completed and have been staffed extensively and validated through a Fort Leavenworth-sponsored Combined Arms Assessment Team (CAAT) visit to Iraq this year. FM 3-34.230, *Topographic Operations*, is being replaced by FM 3-34.600, *Geospatial Engineering*, and the initial draft has been delivered to the Engineer School. We will be soliciting your comments on this draft manual. There are also two new MANSCEN doctrinal publications that you should become familiar with—FM 3-90.31, *Maneuver Enhancement Brigade (MEB) Operations*, and FM 3-10, *Protection*. The *MEB Operations* manual can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*>; the *Protection* manual is in draft form and can be obtained by contacting Lieutenant Colonel Hank Thomsen at <*leon.mdottddengdoc@conus.army.mil*>.

Organization

Getting the right engineer command and control (C2) into the structure is crucial and remains the top organizational priority. We work this every day and know how important it is. We also know that we don't have it exactly right yet, but thanks to you, we have continued to provide excellent support to commanders with whatever structure is in place. While all C2 is important, we believe that our most critical nodes, given the current organizational structure, are the brigade combat team (BCT) engineer and the functional engineer brigade headquarters. Colonel Tipton has already discussed the challenges in the BCT. Above the BCT level, we must fully define the roles and responsibilities of the functional engineer brigade and deconflict those roles with the MEB. We are working on a study with the Office of the Chief of Engineers–Pentagon (OCE–P) and the United States Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC)–Leavenworth to formally document the roles and responsibilities of the engineer brigade.



FM 3-0

OPERATIONS:
FULL
SPECTRUM
OPERATIONS

Approved for public release; distribution is unlimited.

HEADQUARTERS
DEPARTMENT OF THE ARMY

Publication of our capstone manual, FM 3-34, is imminent and will align our doctrine with FM 3-0, *Full Spectrum Operations*

The modular engineer force and the force pool are quickly coming on line. We went to a modular force on purpose. Since there aren't enough engineer units to embed all the required engineer structure into 76 BCTs across the Army, we must have our units in a force pool so they can be task-organized when required. We worked hard to make most of our modular

Smith Hall, home of the Counter Explosive Hazards Center

Although it isn't final yet, we are optimistic that we will see engineers added into the future combat systems (FCS) brigade formation. Many of the traditional engineering problems were assumed away in hope of breakthrough technologies, but the reality of the FCS capabilities will require engineers to be organic to the future brigade combat team (FBCT). We have proposed a structure similar to the engineer formations in the HBCT, but with the addition of a gap-crossing capability that the HBCT does not have. Again, this is predecisional, but we are fully engaged in this effort and the engineering requirements are being addressed at the highest levels of the Army. (POC: Lieutenant Colonel Steve Danner at <*Stephen.Danner@us.army.mil*>)

forces very focused in their mission. We've heard comments from the field that people want more multifunctional modules. We are studying this, but would ask for the time being that we let the modular force get fielded first, and that we don't make radical changes until we've had the chance to fully understand and assess the force across the full spectrum of operations—not just stability operations—that we have designed.

The Army has worked very hard to field the clearance companies. The challenge has been that almost all the clearance equipment has gone directly into the combat theaters to support operational needs statements. While this has delayed standing up the organizations, it has provided a needed capability in-theater, and we have learned a lot of valuable lessons with regard to route and area clearance. Based on our experience and comments from the field, we will adjust the clearance company structure in the near future.

We are standing up forward engineer support team–advanced (FEST–A) and forward engineer support team–main (FEST–M) organizations across the Regiment. These are critical links to the United States Army Corps of Engineers (USACE) Field Force Engineer program and provide a tremendous technical capability to our formations. These teams have been outstanding in both War on Terrorism and civil support missions, and it's a great accomplishment that they will now be formally recognized as part of our engineer structure and resourced with personnel and equipment.

We have recently gained support from TRADOC to have a geospatial warrant officer (215D) added to the heavy brigade combat team (HBCT) and the infantry brigade combat team (IBCT), as well as the armored cavalry regiment (ACR). Previously, this only existed in the Stryker brigades, but due to the outstanding performance of these terrain experts, the Army has realized that we need this capability across the force. If this is approved by the Army, it will take a couple of years for us to grow enough 215Ds to fill all of these positions, but this is a big win for the Army.

Training

Under the new TRADOC Center of Excellence model, the Engineer School is postured to focus on training and leader development. We have processes to continually review all of our institutional courses to ensure that they are relevant and current. Based on FM 3.0 and feedback from the field, there are numerous topics we'd like to add to courses. The constraint is that TRADOC has mandated zero growth in course lengths while simultaneously adding more Army-directed training. We have been successful in gaining approval to run some pilot topics that will add 3 to 5 days to officer, warrant officer, and noncommissioned officer (NCO) courses. Key topics that have been or will be added to courses include contracting officer's representative (COR), more in-depth project management, and joint engineer operations. Recent efforts to move toward less classroom lecture and more hands-on instruction include increased use of tactical exercises without troops (TEWTs) and introduction of interactive simulations, such as DARWARS Ambush! (route clearance simulation); Think Like a Commander and Gator 6 (leadership simulations); and planned trial use of virtual training to include the "Virtual Route Clearance Trainer" and improvised explosive device defeat (IEDD) training via Dismounted Soldier. Additionally, more integrated training among captain and lieutenant courses and lieutenant and NCO courses is occurring. Slowly, the Engineer School is offering the ability of students to "test out" of selected training within courses in exchange for additional training and education in other pertinent subjects or deeper training and education within the validated curriculum.

The Engineer School's Directorate of Training and Leader Development continues to struggle in proper military manning

MANSCEN will recommend to the VCSA that all military working dog handlers be placed in a single MOS.

of instructor and training developer positions. We do need help from our brigade commanders and command sergeants major to identify the best candidates to serve as our small-group leaders to teach and develop our leaders of tomorrow. The commandant is reviewing officer record briefs (ORBs) of potential small-group instructors for assignment to the Engineer School for spring/summer 2010. If you have a strong company commander with downrange experience projected to come out of command next spring/summer, please talk to that person and send me his or her name. These officers will be personally managed by the commandant and will be well taken care of. More important, this small group of officers will have a profound effect on the quality of our future Regiment. TRADOC is currently considering some major changes to the Captains Career Course. One of the goals is to increase and enhance the common training that all captains receive. Our concern is obviously that we cannot afford to reduce the branch-specific training and the technical engineering aspects of the curriculum as we implement the *Building Great Engineers* (BGE) Campaign Plan. (POC: Colonel Jerry Meyer at <*Jerry.Meyer@us.army.mil*>)

Probably our most relevant and cutting-edge ongoing training is at the Counter Explosive Hazards Center (CEHC). So far, we've trained more than 2,000 U.S. Soldiers, Marines, and coalition forces this year in the following courses: Route Reconnaissance and Clearance Operations–Operator, Leader, Sapper, and Maintainer; Counter Explosive Hazards–Planner; Intermediate Search Operations; Area Clearance; and Improvised Explosive Device Defeat–Train the Trainer. The outstanding job the CEHC team is doing was validated during the CAAT visit to Iraq in September and by the number of Soldiers who provided positive comments on the training and the equipment. CEHC continuously adapts the training it provides, and the training programs now focus on training teams rather than individual training. We are incorporating many search techniques into the training as well. Engineers across the Regiment should take great pride in the work they are doing to defeat improvised explosive devices (IEDs) and the work CEHC is doing to advance this effort. Over the past year, the international community has recognized that our U.S. engineers and the CEHC comprise the single most qualified organization to train Soldiers and leaders on route clearance operations. International military engineers are eager to receive this highly coveted training. Within the past few months, we trained engineers from Canada, Turkey, and Korea, as well as having an exchange with the Ukraine. Over the next few months, we will be training engineers from France, the United Kingdom, and Germany and will hold an exchange with the Dutch and Israelis. The CEHC has truly become a center with unique expertise found nowhere else in the world right now. We are currently updating the CEHC concept plan to institutionalize this training in TRADOC. (POC: Colonel Dave Theisen at <*David-Theisen@us.army.mil*>)

Materiel

Our materiel acquisitions and fieldings are getting the right equipment to our next deploying units and to the units in-theater to meet mission requirements. We continue to have challenges to field continental United States (CONUS) units the equipment and training assets they need prior to deployments. The acquisition community is working hard to meet these needs. The training base has acquired mini construction equipment to augment the fleet of hydraulic excavators (HYEX) and dozers, because the full-size equipment is needed for missions elsewhere. The first suite of 30 HYEX computer simulators has been installed at Fort Leonard Wood, with dozers, motor graders, scrapers, and loaders to follow.

Our materiel team is tracking more than 100 systems, and the current commandant's top 10 priority systems are as follows: Joint Assault Bridge (JAB), High-Mobility Engineer Excavator (HMEE), Medium Mine-Protected Vehicle (MMPV), Mine-Protected Clearance Vehicle (MPCV), Vehicle-Mounted Mine Detector (VMMD), Digital Topographic Support System (DTSS), 2.5 cubic yard Loader, Special Construction Equipment, 4-5 cubic yard Loader, and the Ribbon Bridge Transporter. The review cycle for updating our "1 to n" lists will take place later this spring. (POC: Lieutenant Colonel Steven Wall at <*Steven.Wall@us.army.mil*>).

Leadership and Education

Our highest priority in the leadership area remains improving the tactical and technical skills of our officers, warrant officers, and NCOs. We've worked this hard for the past year and have made real progress on the *Building Great Engineers* Campaign Plan. I'm really pleased at the way we have been able to partner with the field and with the Society of American Military Engineers (SAME) to advance this critical program. Progress toward *Building Great Engineers* includes advancements in the following working group areas: Future Roles, Missions, and Methods of Delivery; Accessions; Training and Education; Employment; Retention; and Strategic Communications. Thanks to all the people in the field and thanks to SAME for leading and participating in these work groups.

Be watching for changes in both officer and NCO education in the very near future. TRADOC is looking at a Captains Career Course redesign and really focusing on the common core tasks that all captains need to be trained on. Our challenge will be to ensure that we maintain or improve the amount of branch-specific technical training that our captains receive. The Noncommissioned Officer Education System (NCOES) will also transform. NCOs will attend an Advanced Leader's Course and a Senior Leader's Course. These courses will basically cover the topics that are now taught in the Basic Noncommissioned Officers Course (BNCOC), the Advanced Noncommissioned Officers Course (ANCOC), and the First Sergeant's Course. (POC: Colonel Jerry Meyer at <*Jerry.Meyer@us.army.mil*>)

Personnel

As most of you know, we have consolidated the military occupational specialties (MOSs) 21J, 21F, and 21E into MOS 21E (commonly known as "Super Echo"). Training for this MOS is underway and going very well.

We are also working on an overarching strategy for our military working dog handlers. We are working with MANSCEN, the United States Army Military Police School, and the United States Air Force (the executive agent for military working dogs) and have proposed a comprehensive solution to consolidate all dog handlers into a single MOS called 31K. This recommendation is just one of several that were the result of a Vice Chief of Staff of the Army (VCSA)-directed review of military working dogs. With a dedicated MOS, Soldiers will be able to serve as dog handlers throughout their career (rather than just for an assignment) and in a career in which they will handle several different types of military working dogs. New organizations and new equipment are also part of the study recommendations. There are many advantages to this, but some of our Soldiers are concerned that they might have to become military police if they want to continue to work with dogs. It's too soon to know all the answers, but the plan is that engineers would not be moved out of an engineer MOS unless they requested to do so. Also, any solution will not change the relationship of engineers to mine dogs or special search dogs; these capabilities will remain available to the Regiment. Once we have an Army-approved decision, we will share the full details of this with the field.

The Engineer Personnel Proponency Office (EPPO) has been working with the geospatial, Department of the Army, and intelligence communities to have all 21Y (geospatial engineer) positions coded for Top Secret clearance. If you have 21Ys in your units, go ahead and submit them for Top Secret clearances now.

We just recently staffed the update of Department of the Army Pamphlet 600-3, *Commissioned Officer Professional Development and Career Management*, and the redefining of critical jobs for our engineer leaders. The old term of *branch qualification* has been replaced by the terms *key* and *key development jobs*. The new pamphlet also introduces the new term of *developmental or broadening assignments*, which will carry added emphasis and importance to our officer and

(Continued on page 19)

Medium Mine-Protected Vehicle (MMPV)

BGE ACCOMPLISHMENTS: TRAINING AND EDUCATION WORK GROUP

By Dr. Troy Messer

The United States Army Engineer School, Directorate of Training and Leader Development (DOTLD) and Department of Instruction (DOI) are leaning hard into the flywheel. Here at the School, the DOTLD team is employing and empowering the right people to develop and deliver *Building Great Engineers* (BGE) initiatives. Recent actions include expanding the engineering body of knowledge with academia and partners using joint, interagency, intergovernmental, and multinational (JIIM) training events; integrating gaming and technology into the classroom; and expanding leader development and education (LDE) initiatives that include degree program opportunities and joint engineer training partnerships with other Services.

Body of Knowledge

DOI invited Dr. Brock Barry, who will soon be a faculty member of the United States Military Academy (USMA) and Professor in the Department of Mechanical and Civil Engineering, to the Engineer School in February 2009 for an in-depth orientation of the engineer enlisted training program. The briefings highlighted vertical, horizontal, general, and combat engineering at Brown Hall and the Million Dollar Hole training sites. Dr. Barry's expertise in engineering education was turned toward assessing engineer officer education, covering the Basic Officer Leader Course (BOLC) III, the 210A Warrant Officer Basic Course (WOBC), and the Engineer Captains Career Course (ECCC). On the surface, this may not seem to have a high payoff for training and education, but when you consider that Dr. Barry is one of the country's first doctors of philosophy in engineering education, this takes on a whole new meaning. He will serve as a direct link between USMA and the Engineer School in improving the cradle-to-grave education lifecycle of engineers. DOTLD is participating with USMA's Master Teacher Certification program and looking for opportunities to partner with the USMA Engineering Department, starting with Dr. Barry speaking at the 2009 ENFORCE training and education workshop.

JIIM Training Events

We are seeking every opportunity to expand engineer officer curriculums into the JIIM context. Guest speakers from the International Committee of the Red Cross (ICRC), the United States Agency for International Development (USAID), and State Emergency Management Agency provide program overviews to ECCC students in their general engineering module. And recently, selected ECCC small group instructors (SGIs) and ECCC students were given the opportunity to attend the Joint Engineer Operations Course (JEOC).

Mr. Andrew Bell, military delegate of the ICRC, visited Fort Leonard Wood to address the 01-09 ECCC class on

24 February 2009. The subject was the role of nongovernmental organizations (NGOs) in conflict zones. He placed the ICRC in context with the thousands of other NGOs operating worldwide and further defined the mission, objectives, and activities in current conflict locations (such as Iraq, Afghanistan, and the Horn of Africa). His defining the role of ICRC, the American Red Cross, and Red Crescent Societies engendered a high level of interest and interaction from the students.

The ECCC hosted Structural Assessment Visual Evaluation (SAVE) training on 12 February 2009 to increase technical competency and partner with academia (Missouri University of Science and Technology) and federal, state, and local governments. The training, sponsored by the Fort Leonard Wood Chapter, Society of American Military Engineers (SAME), brought the Missouri State Emergency Management Agency (SEMA) SAVE coalition to Fort Leonard Wood. The training taught 64 ECCC students, 2 ECCC cadre, a Directorate of Contracting employee from Fort Leonard Wood, and 6 state and local emergency management personnel in preparation for assessing building structures affected by earthquakes, tornadoes, floods, or natural disasters that cause structural damages for both domestic and theater applications. The student comments were best reflected in this one comment: "It was an awesome experience, and I can speak for many of my peers when I say that the information we've drawn from just this one event will pay huge dividends in our future deployments. The application to our work in Iraq and Afghanistan is obvious. Thanks so much!" All students were offered the opportunity to obtain certification along with their completion-of-training certificate.

DOI is integrating as many curriculum advances as it can. Some of the advances include sending ECCC students and SGIs to JEOC and piloting contracting officer's representative (COR) training and environmental training and education. Two ECCC SGIs and three students will have the opportunity to attend the JEOC hosted at Fort Leonard Wood on 13 – 17 April 2009. The JEOC is just one training opportunity that ECCC and BOLC students can take advantage of if they test out of certain modules in general engineering and basic demolitions.

The United States Army Training and Doctrine Command (TRADOC); Human Resources Command (HRC); and the Department of the Army Operations and Plans (G3), Civil Affairs (G5), and Information Operations Staff Officer (G7) approved DOI to pilot three days of COR training for the ECCC, Engineer BOLC, WOBC, 21H Basic Noncommissioned Officer Course (BNCOC) and Advanced Noncommissioned Officer Course (ANCOC), and 21N BNCOC and ANCOC. The 20 hours include the minimum essential training requirement to become a COR according to the Federal Acquisition Regulation (FAR) and TRADOC Regulation 5-14, *Acquisition Management and Oversight*, dated January 2009. DOI has trained a total of 328 students since June 2008 (86 BOLC, 35 WOBC, 204 ECCC, 57 21H BNCOC and ANCOC, and 11 21N ANCOC students) in the following subject areas (located at <*http://www.atrrs.army.mil/channels/aitas*>):

- CLC 106 – Contracting Officer Representative With a Mission Focus (minimum 8-hour requirement)
- CLC 011 – Contracting for the Rest of Us
- CLM 024 – Contracting Overview
- CLM 003 – Ethics Training for Acquisition, Technology, and Logistics (AT&L) Workforce

DOI and the Directorate of Environmental Integration (DEI), in response to surveys of 125 ECCC students and field commander comments, assessed environmental compliance in the curriculums. As a result of the assessment, DOI and DEI are partnering to gain approval for a pilot, three days of environmental training and education for the Engineer BOLC and four days for the ECCC and WOBC. In order for U.S. troops to be out of Iraq by 2012, Multinational Corps–Iraq (MNC–I) C7 (senior staff engineer in Iraq) indicates this training gap must be addressed. Current environmental understanding needed to support the Army Force Generation (ARFORGEN) process is inadequate. The pilots will address training and education in designing, building, and maintaining solid waste and wastewater systems and conducting environmental baseline surveys.

Gaming and Technology

Gaming and technology in the classroom are becoming the new enablers to overcome instructor personnel shortages and the constraint to grow engineer courses. DOI has implemented several new technology initiatives in the following BOLC areas:

- General Engineering Division – Use of the Turning Point Classroom Response System (CRS)
- Combat Engineering Division – DARWARS Ambush! and Virtual Battle Space 2 (VBS2)™ Route Clearance Gaming Software
- Officer Training Development Division (OTDD) – Implementing Gameshow Pro for classroom learning

DOTLD is also seeking funding for laptop computers in the classroom. The integration of these technologies will create challenging student-centered learning and collaboration. Current technology trends in civilian and military academia, such as USMA, Fort Knox Armor School Maneuver Captains Career Course, Armor BOLC, and Virginia Technical College of Engineering have all adopted the same or equal classroom technologies (to include laptops) as learning multipliers, a best practice by any standard.

Degree Program Opportunities

Currently the Engineer School participates with several universities with branches at Fort Leonard Wood to provide cooperative credit, master's degree programs such as engineering management, civil engineering, geological engineering, and public and business administration.

From 1995 until the present, 427 students have graduated with a degree in engineering management, 319 in civil engineering, and 189 in geological engineering. Currently, 15 students are enrolled in a degree program in engineering management, 1 in civil engineering, and 29 in geological engineering. While the opportunity is now only provided to ECCC graduates, Engineer School cadre and the Fort Leonard Wood Noncommissioned Officer (NCO) Academy are forming an exploration committee to conduct a limited pilot of this program with NCOs and junior officers (BOLC, WOES, 21B BNCOC and ANCOC, 21H BNCOC and ANCOC, and 21N BNCOC and ANCOC graduates).

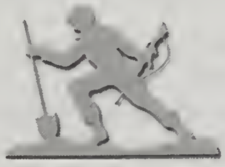
Joint Engineer Training Partnerships

DOI is actively collaborating with the Air Force Institute of Technology (AFIT) to conduct a pilot exchange of program material and course seats. It has been discussed as an initial way ahead that two to five ECCC students each quarter could attend AFIT's WMGT 585, Contingency Engineer Command Course, depending on AFIT course fill, and continue to discuss the possibility of seats in WMGT 570, Civil Engineer Superintendent Course, and WMGT 436, Operations Course, in order to gain a joint context between the two Service engineer schools. Additionally, DOI would provide Army engineer lesson(s) at a 101 level to various AFIT leader courses focusing on types of operations orders, fragmentary orders, and warning orders; mobility; countermobility; assured mobility; and counterinsurgency. This partnership would allow AFIT to attend video teleconferences (VTCs) to gain awareness of current Army engineer theater operation events through monthly and quarterly secure VTCs, such as Multinational Coalition Forces–Iraq, Fusion Cell, Worldwide Engineer VTC, and the Engineer Training Support Network (ETSN).

Summary

DOI, in support of the *Building Great Engineers* Campaign Plan, is making deliberate and positive progress. We continue to engage in new initiatives such as the body of knowledge, technology in the classrooms, and JIIM partnerships. We encourage positive and negative constructive feedback from the field so that we can gauge our true progress.

Dr. Messer is the technical director of the Department of Instruction, Directorate of Training and Leader Development, United States Army Engineer School. He retired from the Army in May 2001 as a sergeant first class after serving four stateside tours, three overseas tours, and one combat tour in Panama during Operation Just Cause. He is an Army Civilian Education System advance graduate.



("DOTMLPF," continued from page 16)

warrant officer career tracks. The Regiment is now at a crossroads, and we need to decide whether to manage officers with a single career track as we do now or go back to some kind of multiple tracking system like the 21A, B, and D series we had several years ago. We will develop courses of action at the Engineer School and rely on feedback from the field in order to get this important decision right. (POCs: Lieutenant Colonel Keith Dupont at <*keith.dupont@us.army.mil*> and Colonel Joe Cepeda at <*Jose.Cepeda@us.army.mil*>)

Facilities

We are working a number of local issues here at the Engineer School (such as the Prime Power School move to Fort Leonard Wood and new facilities for training the JAB and the assault breacher vehicle (ABV), but most of these will be invisible to the field. The real emphasis here over the next few years will be getting our units aligned for training. The United States Army Forces Command (FORSCOM) engineers are managing this for the Army, but the ultimate goal is to get our units colocated with maneuver units whenever the opportunity exists. Also, in May-June of this year, the Engineer School headquarters will move into improved office space on the first floor and will have a dedicated Engineer School entrance.

Another aspect of facilities that I will highlight is the Basecamp Integrated Capabilities Development Team (ICDT) that is being conducted at the MANSCEN level. While we have a lot of experience and expertise on basecamps, there is still no overarching doctrine that covers construction, operation, and closing of basecamps. MANSCEN is working to gain this proponency and the resources required to execute this mission for the Army. (POC: Mr. Steve Orth at <*Steven.Orth@us.army.mil*>)

Summary

As you can see from these highlights, this is an exciting time for the Regiment, and we have numerous actions underway that will shape the branch for many years to come. Feedback from the field is always appreciated. Please feel free to contact me or any of the points of contact previously listed if you are interested in knowing more details on these actions or if you have ideas to submit. Thanks in advance for your comments and thanks to the entire Regiment for the outstanding jobs that are being executed every day across the full spectrum of operations.

Colonel Rowan (Retired) is the Deputy Assistant Commandant, United States Army Engineer School. Previously, he served as the Assistant Technical Director for Military Engineering at the United States Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi. Other key duty positions include Commander, ERDC; Commander, 1st Engineer Brigade; Commander, 54th Engineer Battalion; and Commander, 16th Engineer Battalion. He has served in Operation Iraqi Freedom both as a military officer and a civilian.

Officer Professional Development in a BGE World

By Lieutenant Colonel Scott C. Johnson

Over the last three to four years, our Engineer Regiment's force structure reemerged in the form of the Future Engineer Force. This engineer force included a much larger ratio of combat capability to construction or technical capability than it did in the recent past. These units need leaders and Soldiers with more technical engineering skills and abilities, and the need for these skills and abilities goes beyond the more technically oriented units.

With the February 2008 revision of Field Manual (FM) 3.0, *Operations*—and through personal experience, officially published lessons learned, and feedback from peers and superiors—there is a consensus that United States Army engineers at every level, from brigade combat team (BCT) platoon leaders to staff officers, need to improve their general engineering technical skills to better support full spectrum operations. In a nutshell, this is the central theme of the *Building Great Engineers* (BGE) Campaign Plan.

How We Got Here

Whether they admit it or not, over the years many of our fellow engineer officers have had a maneuver fetish, real or impressed upon them by the maneuver-centric environment in which they found themselves. The focus on maneuver shaped the Engineer Regiment's doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) decisions and focus over the 15 to 20 years before 11 September 2001. The maneuver mentality was in direct response to the Army's focus on training for direct combat versus a more holistic approach to warfare that emerged with the version of FM 3.0 published in June 2001.

The direct combat focus enabled and enhanced the Army's ability to synchronize combat operations, which in turn facilitated successful (albeit limited) operations that culminated in the initial operational success in Iraq. Operation Desert Storm fits into this context due to the limited time frame and objectives of that action. Force-on-force operations during rotations at the United States Army combat training centers were the culminating point of combined arms training for BCTs.

Similarly, direct engagement-focused computer simulation exercises at the division and corps levels almost never transitioned beyond the *fight* and barely touched on the next phase. In reality, the brigade, division, and corps exercises rarely incorporated the detailed planning and execution requirements of large-unit deployments and sustainment, or the enormous tasks associated with building the infrastructure that supports our forces. These exercises did little to prepare the Army for the realities of repairing a defeated nation—helping to provide essential services, security, economic recovery, or capacity-building.

To maintain relevance in a direct combat-centric environment, engineers focused on the mission at hand—combined arms offensive and defensive operations. Critical training on general engineer skills and competency requirements were stripped away from all but construction units, and the construction units on active duty were reduced in number and size. The harsh reality was that these types of units just weren't relevant to the majority of the training being conducted by BCTs, divisions, and corps.

The importance of general engineering missions and unique contributions failed to fully register with the decision makers developing the Army's future force structure. Engineer force structure continued to pay bills for a more maneuver-centric Army with the initial transformation to a more modular force.

The Stryker BCT, in the form of the interim BCT in 2000 and the initial modular BCT-centric designs that emerged in 2003 and 2004, did not appear to recognize the unique contributions of the Engineer Regiment. The experiences of Operation Enduring Freedom and Operation Iraqi Freedom validated the need for a more robust engineer force and a renewed requirement for general engineering skills to support the Army.

The latest revision of FM 3.0 validates these requirements and suggests a requirement for additional modifications to the force structure that will enable the Engineer Regiment to support offensive, defensive, and stability operations or civil support operations equally.

Skills Engineer Leaders Need

While the brief history lesson above is instructive on how the Engineer Regiment was formed, developed, and transformed—and is in the process of transforming again—the Army requires engineer leaders who are able to operate effectively within the engineer force and across the full spectrum of operations. In addition to well-honed tactical skills and acumen, engineers need unique engineer-specific skills to enable the overall success of the operations. The listed tasks and skills are not inclusive, nor are they limited to a single area of full spectrum operations.

Offensive and Defensive Operations

- Analyze and/or shape terrain to maximize the effects of direct and indirect fires in support of a maneuver force or to protect a designated area.

- Analyze, plan, resource, build, maintain, and/or provide lanes in impediments to movement, to include lines of communication through natural and man-made terrain that enable movement in support of operations across the full spectrum of operations.
    - ☐ Know and understand maneuver doctrine and how engineers support offensive and defensive missions in urban and restricted terrain.
    - ☐ Know and understand Army and enemy mobility/countermobility systems and capabilities and how to maximize their employment or counter their strengths.
    - ☐ Know and understand the integration of fires, construction of survivability positions and the synchronization of effects.
    - ☐ Know and understand how to enhance mobility by synchronizing effects and/or providing a means to assured mobility in any environment.
    - ☐ Know, understand, and be able to execute bridge/gap reconnaissance and develop standard and nonstandard gap crossing and solutions.

Stability Operations or Civil Support Operations

- Design, resource, and build (or have built) force projection structures and life support areas to support our own forces in an austere environment (stability operations or civil support operations).
- Identify, design, resource, and build (or have built) projects that promote economic development and/or restore essential services in a permissive and semipermissive environment.
    - ☐ Know and understand Army combatant command and Department of Defense standards and planning factors for force protection and life support requirements.
    - ☐ Know and understand how to develop statements of requirements (SOR), statements of work (SOW), and bills of material (BOM) and how to submit projects for contracting, funding, and resourcing.
    - ☐ Know and understand the quality assurance (QA)/quality control (QC) process for construction and other engineer-related projects and how to perform as the contracting officer's representative (COR).
    - ☐ Have a basic knowledge of essential services and how the systems function and interact.

A strong working knowledge of the stability operations and civil support operations skills listed above is a good basis for the emerging mission of capacity-building with civil authorities and local military forces. Engineer officers must know how to effectively use translators and interpreters, have a basic understanding of the local culture, and know how to engage the media.

Developing, Training, and Enhancing Skills

The tasks and skills listed above provide a framework for developing a personal and professional education program to supplement both a junior officer's college education and the United States Army Engineer School Professional Military Education (PME) program. While the content of the Basic Officer Leader Course (BOLC) III and Captains Career Course (CCC) PME is evolving to meet the demands of the field, the Engineer School has not evolved as an institution to the point where it can produce fully functional engineers capable of executing the wide variety of missions expected of our Engineer Regiment. However, the School continues to adapt. It recently added COR training and just completed its first pilot of Structural Assessment Visual Evaluation (SAVE) training on 12 February 2009.

Now more than ever, a well-thought-out officer professional development (OPD) program and an individual professional development program can significantly enhance the overall professionalism within the Engineer Regiment. Tuition assistance and the ability to coordinate/request training by contractors or through civilian institutions provide a wide range of potential training opportunities on technical topics.

Additional resources and ideas for engineer skills training, although not inclusive, include the following:

Partnering With Installations

- Installation Department of Public Works (DPW) troop construction programs were a major venue for project development and execution for many of our construction engineers. These projects can provide opportunities to train both horizontal and vertical skills, estimating, and QA/QC procedures.
- Most DPWs own and operate the essential services—such as sewer, water, power transmission, gas, and fiber optics—of the installation. With coordination, these systems can become training venues for engineer leaders, either through OPD or on-the-job training (OJT).
- DPWs execute or have oversight over many projects that fall short of the military construction, Army (MCA) threshold. These project sites make great venues for construction OPDs, site visits, and concepts/construction techniques teaching opportunities.
- If additional time is available, units could create intern-style relationships with DPWs that would provide OJT for officers and noncommissioned officers (NCOs) in fields ranging from environmental engineering to civil engineering and from project management to project development (SOR, SOW, and BOM) in support of the range development process or other requirements.

Partnering With Local Governments and Government Agencies

- City, town, and county governments provide services to their citizens and provide a great venue for OPDs on basic

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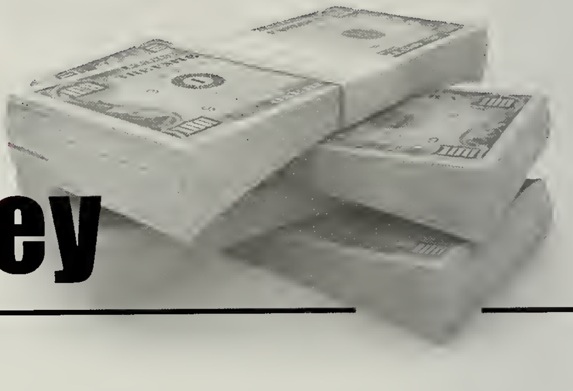
Show Me the *Building Great Engineers* Money



By Lieutenant Colonel Scott C. Johnson

There are several venues engineer Soldiers can take to obtain certifications and licenses and to get technical-related training. Funding is available now through the tuition assistance (TA) program and through the GI Bill. Units cannot use operations and maintenance funds for individual training and certification, but those funds can be used to pay for mission- or contingency-related technical training for Soldiers.

Programs

There are three programs—Army COOL (Credentialing Opportunities On-Line), DANTES (Defense Activity for Nontraditional Education Support), and AVOTEC (Army Vocational/Technical) Pilot Program—that provide information, training that leads to certification, and/or testing for Soldiers using TA and/or the GI Bill. The licenses available through these programs include engineer, construction, and technical certifications and licenses. Two of the three programs can be used to fund the Professional Engineer (PE) license exam.

Army COOL *(<www.cool.army.mil/>)* provides information and some training resources that can lead to technical credentials. This site focuses on enlisted Soldiers and directly ties unique credentials to specific military occupational specialties (MOSs). Many of these are relevant to engineer commissioned and warrant officers. For example, the 21Z MOS (combat engineer senior sergeant) links to the Certified Associate in Project Management (CAPM) and the Project Management Professional (PMP) credentials. Army COOL also points to training and funding sources such as TA, eArmy U, and the GI Bill. PMP training and testing are available online now through eArmyU.

DANTES *(<http://www.dantes.doded.mil/Dantes_web/certification/Calendar.htm>)* is a Department of Defense (DOD) program that lists multiple credentialing organizations and licenses that can be tested for, or administered through, Army and other Service education centers. Test costs may be covered by TA or the GI Bill and include certificates in building construction, construction materials testing, geotechnical, land management/water control, transportation, and underground utilities construction by the National Institute for Certification Engineering Technology. The Certified Professional Constructor certificate is from the American Institute of Constructors.

Army Vocational/Technical (AVOTEC) Pilot Program

AVOTEC *(<https://www.hrc.army.mil/site/education/index.html>)* is a 2009 Army pilot program funded via TA for credential-producing programs and license and certification examinations. The pilot ends in September 2009, and according to the website, Soldiers must be enrolled in a credential-producing program before that cutoff date. AVOTEC offers online and traditional education programs on a state-by-state basis. Right now there is an online program that leads to certification as a professional home inspector. Traditional certification and licensing programs offered by a local or state institution must be registered with AVOTEC for Soldiers to receive funding. There is an opportunity for each installation to develop credential-producing relationships with local vocational institutes, community colleges, and other continuing education programs. Additionally, Soldiers can use the AVOTEC system to pay for certification and license examinations by accredited organizations.

TA is available for lifelong learning and continuing education courses in technical-related fields for all Soldiers. The GI Bill will pay for certification and licensing fees and renewals and approved courses leading to the same. Soldiers must be eligible to receive GI Bill benefits. The good news for non-prior service officers is that the GI Bill that kicks off in August 2009 is open to all Soldiers. According to the latest information from the United States Department of Veterans Affairs website, the new GI Bill will pay for one certification test.

Another venue for technical-related training can be pursued via a unit's operations and maintenance funds. These funds can be used to send Soldiers to approved courses such as the United States Army Corps of Engineers Proponent-Sponsored Engineer Corps Training (PROSPECT) program. Unit commanders can also establish Soldier technical skills training courses according to Army Regulation 350-1, *Army Training and Leader Development*, through the Army Education Center via a contractor, although Department of the Army approval may be required if a contractor is used. This type of training could be developed to contribute to the overall body of knowledge required to successfully pass a technical certification or license exam. This technical training could also be tailored as required for contingency missions.

Summary

While the programs and resources described above aren't comprehensive or well-known, they provide a funding source and venue for both technical training and certification for a large proportion of engineer Soldiers. As leaders, we need to know and understand these programs and encourage Soldiers to take advantage of them. Certification, licensing, and the associated training will significantly improve our overall technical competence and capabilities.

Lieutenant Colonel Johnson is the United States Army Engineer School Chief of Staff. He commanded the 1-3 Brigade Special Troops Battalion, 1st Brigade Combat Team, 3d Infantry Division, from 20 June 2006 to 17 June 2008.

("Professional Development," continued from page 21)

services, essential services, emergency services, goverment processes, and a variety of construction projects.

- The local United States Army Corps of Engineers (USACE) district can provide venues for OPDs and MCA/civilian project site visits and intern-style arrangements.
- The Federal Emergency Management Agency (FEMA), Department of Homeland Security (DHS), United States Department of Housing and Urban Development (HUD), American Red Cross, and other agencies and activities may also provide unique opportunities and perspectives on essential services and other technical engineering issues.

Nongovernmental Agencies

- Habitat for Humanity and other charitable organizations routinely have ongoing construction projects where junior leaders can volunteer and obtain direct construction experience.

USACE Proponent-Sponsored Engineer Corps Training (PROSPECT) Program

- In addition to partnering with USACE, technical training is available through the USACE PROSPECT Program. Course offerings can be found in the "Purple Book" catalog at *<http://pdsc.usace.army.mil/ >*.
- The Internet also provides an abundance of information on how power generation, water purification, water treatment, road design, QA/QC procedures, and basic horizontal and vertical skills can be brought to bear for OPD or even officer physical training events, to include scavenger hunts, junior officer-led OPDs, and question-and-answer sessions during all-hands events.

Conclusion

The technical training resources and opportunities available to units and individuals are vast. Time, of course, is always an issue, but our Soldiers must balance time available, time between deployments, and family time. It's a challenge, but being able to successfully employ our engineer organizations is also a challenge. Instilling the *Building Great Engineers* ethos for learning our profession is fundamental to our success as engineers.

Leaders throughout the Engineer Regiment must ensure that there is a culture of lifelong learning within our officer and NCO corps that promotes technical as well as tactical proficiency. Fostering a climate that encourages and promotes individual technical and construction-related excellence and discussion is central to developing the adaptive, innovative, and technically competent culture the BGE Campaign Plan envisions.

Lieutenant Colonel Johnson is the United States Army Engineer School Chief of Staff. He commanded the 1-3 Brigade Special Troops Battalion, 1st Brigade Combat Team, 3d Infantry Division, from 20 June 2006 to 17 June 2008.

ENGINEER OFFICER EDUCATION TRANSFORMATION

By Command Sergeant Major Thomas H. Chambers (Retired)

The Engineer Basic Officer Leader Course (BOLC) III has recently undergone several changes, so many officers in the field may be unaware of the specific types of skills and the actual depth of knowledge that graduates of the BOLC III program of instruction possess. This article outlines these changes as well as other proposed changes to the courses.

Why Change?

A number of factors have led to a change of the Engineer BOLC III program of instruction, to include the rewrite of Field Manual (FM) 3.0, *Operations*; the emergence of the *Building Great Engineers* Campaign Plan; lessons learned from Iraq and Afghanistan; and the need to remain relevant. In particular, the increase in technical skills required and the difficulties faced in the contemporary operating environment (COE) need to be incorporated into the course.

During a course review, the BOLC III team recommended changes that field commanders have requested, such as the following:

- Contracting
- DARWARS*
- Supply Management
- Unit Maintenance Management
- Environmental Integration
- Project Management
- Theater Construction Management System (TCMS)

*DARWARS Ambush! is a personal computer-based simulation that provides a flexible training environment for Soldiers to learn important lessons regarding both mounted and dismounted operations in conflict zones such as Iraq and Afghanistan.

Important Changes

Changes in the course's subject material include greater emphasis on project management, contracting, TCMS, urban operations, counterinsurgency, information operations, and cultural awareness. General engineering instruction focuses on base camp design, project management, contracting, force protection, infrastructure reconnaissance, and field force engineering. The use of war games and simulation has increased, and students fight a battle on a combat simulation program and conduct simulated reconnaissance using the RG-31, Husky, and Buffalo simulators.

The recent changes in the course address the gaps in technical skills proficiency. Each leader will receive training on unit supply and unit maintenance operations required of platoon leaders. We have also incorporated aspects of the COE into every scenario, and students encounter a few of the most difficult realities faced daily in operations. Lessons learned from combat are rapidly included in training to ensure the relevance and currency of the subject matter.

In addition, the United States Army Engineer School has implemented a program to require BOLC III leaders to complete a 24-hour block of prerequisite training in response to comments and suggestions from units deployed to theater. The training program will require students to register and complete the following Defense Acquisition University (DAU) online training:

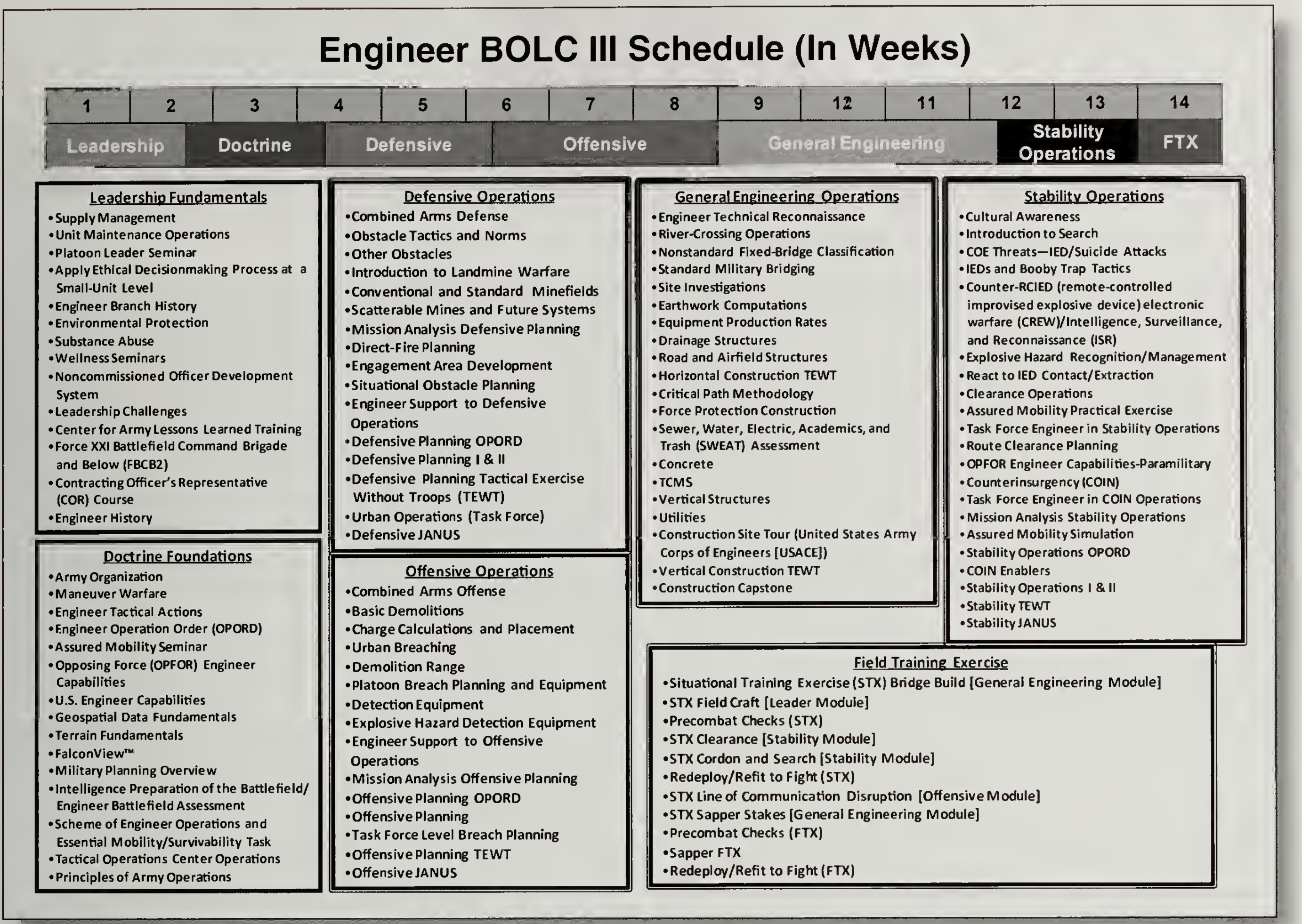
- CLC 106 – Contracting Officer Representative With a Mission Focus
- CLC 011 – Contracting for the Rest of Us
- CLM 024 – Contracting Overview
- CLM 003 – Ethics Training for Acquisition, Technology, and Logistics (AT&L) Workforce

Each module is assigned an outcome that emphasizes the desired end state and provides instructional intent such as the following:

Leadership Fundamentals. Desired outcome: Students will demonstrate a comprehensive understanding of critical engineer training, leader functions, and administrative requirements of a successful platoon leader at the company level.

Doctrine Foundations. Desired outcome: Students will demonstrate a thorough knowledge of engineer doctrine at the company level, including intellectual tools that Army leaders use to solve military problems. Students will also demonstrate a comprehensive understanding of tactics and procedures of the various primary tasks associated with the elements of FM 3-0 full spectrum operations.

Defensive Operations. Desired outcome: Students will demonstrate the ability to employ defensive operations at the company level according to FM 3-0 by integrating a thorough understanding of direct-fire planning, landmine warfare,



Engineer BOLC III Schedule (In Weeks)

1	2	3	4	5	6	7	8	9	12	11	12	13	14
Leadership		Doctrine	Defensive		Offensive			General Engineering			Stability Operations		FTX

Leadership Fundamentals

- Supply Management
- Unit Maintenance Operations
- Platoon Leader Seminar
- Apply Ethical Decisionmaking Process at a Small-Unit Level
- Engineer Branch History
- Environmental Protection
- Substance Abuse
- Wellness Seminars
- Noncommissioned Officer Development System
- Leadership Challenges
- Center for Army Lessons Learned Training
- Force XXI Battlefield Command Brigade and Below (FBCB2)
- Contracting Officer's Representative (COR) Course
- Engineer History

Doctrine Foundations

- Army Organization
- Maneuver Warfare
- Engineer Tactical Actions
- Engineer Operation Order (OPORD)
- Assured Mobility Seminar
- Opposing Force (OPFOR) Engineer Capabilities
- U.S. Engineer Capabilities
- Geospatial Data Fundamentals
- Terrain Fundamentals
- FalconView™
- Military Planning Overview
- Intelligence Preparation of the Battlefield/ Engineer Battlefield Assessment
- Scheme of Engineer Operations and Essential Mobility/Survivability Task
- Tactical Operations Center Operations
- Principles of Army Operations

Defensive Operations

- Combined Arms Defense
- Obstacle Tactics and Norms
- Other Obstacles
- Introduction to Landmine Warfare
- Conventional and Standard Minefields
- Scatterable Mines and Future Systems
- Mission Analysis Defensive Planning
- Direct-Fire Planning
- Engagement Area Development
- Situational Obstacle Planning
- Engineer Support to Defensive Operations
- Defensive Planning OPORD
- Defensive Planning I & II
- Defensive Planning Tactical Exercise Without Troops (TEWT)
- Urban Operations (Task Force)
- Defensive JANUS

Offensive Operations

- Combined Arms Offense
- Basic Demolitions
- Charge Calculations and Placement
- Urban Breaching
- Demolition Range
- Platoon Breach Planning and Equipment
- Detection Equipment
- Explosive Hazard Detection Equipment
- Engineer Support to Offensive Operations
- Mission Analysis Offensive Planning
- Offensive Planning OPORD
- Offensive Planning
- Task Force Level Breach Planning
- Offensive Planning TEWT
- Offensive JANUS

General Engineering Operations

- Engineer Technical Reconnaissance
- River-Crossing Operations
- Nonstandard Fixed-Bridge Classification
- Standard Military Bridging
- Site Investigations
- Earthwork Computations
- Equipment Production Rates
- Drainage Structures
- Road and Airfield Structures
- Horizontal Construction TEWT
- Critical Path Methodology
- Force Protection Construction
- Sewer, Water, Electric, Academics, and Trash (SWEAT) Assessment
- Concrete
- TCMS
- Vertical Structures
- Utilities
- Construction Site Tour (United States Army Corps of Engineers [USACE])
- Vertical Construction TEWT
- Construction Capstone

Stability Operations

- Cultural Awareness
- Introduction to Search
- COE Threats—IED/Suicide Attacks
- IEDs and Booby Trap Tactics
- Counter-RCIED (remote-controlled improvised explosive device) electronic warfare (CREW)/Intelligence, Surveillance, and Reconnaissance (ISR)
- Explosive Hazard Recognition/Management
- React to IED Contact/Extraction
- Clearance Operations
- Assured Mobility Practical Exercise
- Task Force Engineer in Stability Operations
- Route Clearance Planning
- OPFOR Engineer Capabilities-Paramilitary
- Counterinsurgency (COIN)
- Task Force Engineer in COIN Operations
- Mission Analysis Stability Operations
- Assured Mobility Simulation
- Stability Operations OPORD
- COIN Enablers
- Stability Operations I & II
- Stability TEWT
- Stability JANUS

Field Training Exercise

- Situational Training Exercise (STX) Bridge Build [General Engineering Module]
- STX Field Craft [Leader Module]
- Precombat Checks (STX)
- STX Clearance [Stability Module]
- STX Cordon and Search [Stability Module]
- Redeploy/Refit to Fight (STX)
- STX Line of Communication Disruption [Offensive Module]
- STX Sapper Stakes [General Engineering Module]
- Precombat Checks (FTX)
- Sapper FTX
- Redeploy/Refit to Fight (FTX)

engagement area development, obstacle planning, and defensive planning to defeat an enemy attack, gain time, economize forces, and develop conditions favorable for offensive or stability operations.

Offensive Operations. Desired outcome: Students will demonstrate the ability to employ offensive operations at the company level by integrating a thorough understanding of demolitions, breaching, and offensive planning in order to capture the essence of the offensive in engineering operations.

General Engineering Operations. Desired outcome: Students will demonstrate the ability to conduct general engineering operations at the company level according to FM 3-0 by demonstrating a thorough understanding of civil support, restoring essential services, and protecting infrastructure and property according to FM 3-0 by identifying critical aspects of horizontal construction, vertical construction, and bridging operations.

Stability Operations. Desired outcome: Students will demonstrate the ability to employ engineer stability operations at the company level according to FM 3-0 by demonstrating a thorough understanding of counterinsurgency fundamentals and principles, stability operations, COE threats, explosive hazard recognition and management, improvised explosive device (IED) fundamentals, clearance operations, route clearance planning, civil-military operations, negotiations, and search operations.

Field Training Exercise (FTX). Desired outcome: Students will demonstrate the ability to successfully conduct real-time engineer missions at the company level according to FM 3-0 as platoon leaders in a field environment by integrating and reinforcing instruction with tactical mission sets.

Conclusion

The purpose of this article is to keep field commanders informed of the depth and breadth of knowledge that BOLC III graduates possess upon completion of the course. The BOLC III team is working to incorporate many of the suggestions received from the field into the BOLC III program of instruction. Suggestions, lessons learned, and feedback from the field are welcome to ensure that we are providing the Engineer Regiment with the best possible young leaders. Contact the course manager at DSN 581-1310 or by e-mail at <*thomas.chambers1@us.army.mil*>.

Command Sergeant Major Chambers (Retired) is the Engineer BOLC III Course Manager at Fort Leonard Wood, Missouri.

JEOC

JOINT ENGINEER OPERATIONS COURSE

By Mrs. Rachel M. King (formerly Rachel M. Walkenbach) and Mr. Dwayne E. Boeres

The joint engineer community continues to be the tip of the spear for engineering initiatives, and one of its greatest success stories is the Joint Engineer Operations Course (JEOC). This joint engineer opportunity prepares joint staff personnel to respond quickly and adapt effectively to the changing strategic environment. The JEOC is designed to ground students in the responsibilities of a staff officer assigned to the joint engineer staff section of a joint task force (JTF). The major focus of the course is to introduce students to joint doctrine, planning, and operations (specifically engineer operations), and the type of engineer staff positions and associated products engineers are required to develop. Educating and preparing our mid- to senior-level officers, warrant officers, and senior noncommissioned officers (NCOs) for operational assignments in the joint environment, the JEOC operates on the prevailing principle that no engineer should perform a task without first having been educated and trained. This course—which was developed by engineers for engineers—brings together engineers (varying in ranks from E-6/7 to 0-6) from all five Services, government civilians, selected multinationals, and contractors to better prepare engineer operational planners to serve within joint, interagency, intergovernmental, and multinational (JIIM) environments.

Not only will engineers use what they learn in the current operational environment, but they will also use it for future applications to meet the challenges faced by engineer forces of the 21st century. The need for the JEOC is based on guidance from the *National Military Strategy*, the *Quadrennial Defense Review*, and the Chairman of the Joint Chiefs of Staff *CJCS Vision for Joint Officer Development*, as well as other sources. The joint engineer community has set its sights on developing engineers who are better prepared and who can engage and influence engineering factors within the JTF and its combatant commands' areas of responsibility (AORs).

JEOC Dates and Locations
FY 2009 & FY 2010 (Tentative)

The Joint Engineer Operations Course now rotates to four locations each year, providing a course offering at the United States Army Engineer School, Fort Leonard Wood, Missouri; Air Force Institute of Technology (AFIT), Wright Patterson Air Force Base, Ohio; Civil Engineer Corps Officers School (CECOS), Port Hueneme, California; and the Marine Corps University, Headquarters (HQ) Marine Corps, Quantico, Virginia.

13-17 April 2009
12-16 April 2010
Fort Leonard Wood, Missouri
United States Army Engineer School

15-19 June 2009
May 31-4 June 2010
Air Force Institute of Technology
Wright Patterson AFB, Ohio

3-7 August 2009
26-30 July 2010
Civil Engineer Corps Officer School
Port Hueneme, California

5-9 October 2009
(TBD) October 2010
HQ, United States Marine Corps
Marine Corps University
Quantico, Virginia

Course Description

The JEOC is a blended course consisting of both a distributed learning (dL) Phase and a Resident Phase designed for selected engineer officers, senior NCOs, warrant officers, and government civilians who may serve on a joint staff.

Distributed Learning Phase

The JEOC dL Phase is open to all engineers for self-development in JTF engineer operations. Designed to be about 48 hours, this no-obligation, self-paced, self-development course consists of current information in support of joint engineer operations. From across the Services, engineers from combatant commands, government agencies, and contractors have participated in the development of this course and its resources. Students may elect to complete the JEOC dL Phase only, but the interaction and collaboration with students of other Services at the Resident Phase greatly contribute to the success of JEOC.

The dL Phase consists of eight modules with associated lessons that introduce the student to the following:

- Formulating and Integrating United States National Security Strategy
- Joint Operational Planning
- Joint Engineer Service Capabilities: United States Army, United States Navy, United States Marine Corps, United States Air Force, United States Coast Guard
- JTF Engineer Staff Operations and Planning
- Theater Engineer Operations and Base Camp Planning
- Joint Engineer Considerations and Relations with JIIM

- Theater Environmental Considerations
- Resident Phase Preparation Module

Although there is no obligation for completing the dL Phase after enrollment, a dL course certificate (good for one year after completion) is a prerequisite for attending the Resident Phase. An Army Knowledge Online (AKO) or Defense Knowledge Online (DKO) account is required for enrollment.

The dL course enrollment is conducted through e-mail contact with the JEOC Service representatives. (See information at the end of this article.) The Service representative will direct you to the course administrator. For enrollment, you will need to request sponsorship for an AKO account or provide your AKO username information at the time of your request. The administrator will process your enrollment and provide information for access to the JEOC Blackboard site. The dL course is gated and graded and provides a completion certificate (Resident Phase requirement only). The JEOC is not yet an Army Training Requirements and Resources System (ATRRS) integrated course, but course officials are in the process of obtaining United States Joint Forces Command joint certification.

Resident Phase

The JEOC Resident Phase primarily consists of facilitator-led small-group discussions and associated practical exercises (PEs). Integrated throughout the course agenda are thirteen JTF engineer seminar discussions via video teleconference (VTC), guest speaker or panel discussions, and social networking activities with guests from specialized engineering fields. The thirteen seminars are aligned with PEs built around likely JTF scenarios. Students must demonstrate their knowledge and ability to apply joint Service engineer capabilities, common functions, and responsibilities of a JTF engineer staff officer or NCO in a simulated JTF engineer staff environment to develop a joint engineer solution. The small-group discussion topics and PEs are as follows:

- Service Engineer Capabilities
- Engineer Support Plan
- JTF Assignments, Functions, and Roles
- Horizontal Staff Integration
- Engineer Functions
- Facilities Engineering and General Engineering
- Outside-the-Wire JIIM Considerations

Resident Phase seminar briefing and discussion topics are as follows:

- Combatant Command Engineer–AOR Briefing
- Theater JTF Engineer Perspectives and Lessons Learned
- Coalition Engineer Panel (A, B, C Countries)
- JTF Engineer Observations and the Effects-Based Approach to Operations
- Senior Engineer (Joint Staff J4) Theater and Joint Engineer Considerations
- Sourcing and the Request-for-Forces (RFF) Process
- Base Development and Planning
- Environmental Considerations for the JTF Engineer
- Senior Engineer Brief (Service Engineer Chief)
- Engineer Support to JIIM Operations
- Contractors on the Battlefield Panel Seminar and Dinner
- Defense Support to Civil Authorities (United States Northern Command)

Enrollment in the Resident Phase of JEOC requires completion of the dL Phase of the course and a contact request to the Service representative or to the course administrator. Requests for Resident Phase attendance should be made 120 days in advance. Because course quotas fill quickly, consider enrollment as early as possible; seats can be held up to a year in advance. Each course offering supports 60 students. Top priority goes to personnel assigned to a JTF, combatant command, or component command. Second priority goes to personnel with a high probability of being assigned to a joint billet. Third priority is for other personnel who would benefit from attending JEOC.

Summary

The JEOC is a Joint Staff J4 initiative directed through the Joint Operational Engineer Board (JOEB), and the course and the course management team are hosted by the United States Army Engineer School at Fort Leonard Wood, Missouri. The joint engineer community is working to finalize the JEOC as a joint, permanently funded and established functional course by FY2010. This course has graduated 324 engineers from all five Services who are now better prepared for the evolution of the joint warfighter.

Engineer staffs and planners are encouraged to enroll in the Joint Engineer Operations Course! This course provides sufficient grounding for students to understand the responsibilities of a staff officer assigned to the joint engineer staff section of a JTF. The major focus of the course is to introduce students to joint doctrine, planning and operations (specifically engineer operations), and the types of engineer staff positions and associated products engineers are required to develop. For information pertaining to enrollment, contact the course administrator, Mr. Dwayne Boeres, at the Engineer School's Directorate of Training and Leader Development. He can be reached at <*dwayne.boeres@us.army.mil*> or (573) 563-7065.

Mrs. King is the JEOC Course Manager. She is a former Army officer and has worked the development and execution of the JEOC for five years. She is a contractor with C2 Technologies, Inc.

Mr. Boeres is the JEOC Course Administrator. He retired from the Army Engineer Corps in 2006 and has served on the JEOC team for three years.

Advanced Route Clearance Courses: Getting There . . .

By Major Carl Coats and Mr. Larry D. Jackson

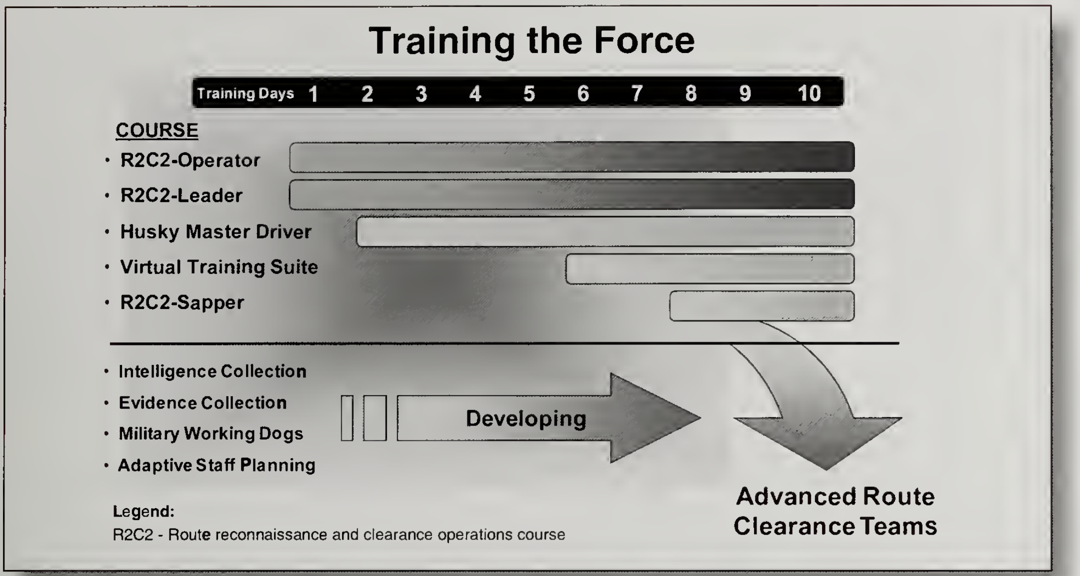
Is the training at the Counter Explosive Hazards Center (CEHC), Fort Leonard Wood, Missouri, individual or collective training? Is it doctrine? Or is it tactics, techniques, and procedures (TTP)? These are questions repeatedly asked about the courses taught at the CEHC. Very much like the battlefields that our Soldiers fight on in the 21st century, the answer is not simple. That is even more true for a center that attempts to teach relevant contingency training that accurately reflects the contemporary operating environment (COE). This article will explain the current suite of route clearance courses taught by the CEHC and highlight some of the future initiatives that are in the pipeline.

Suite of Courses

Route clearance is a mounted operation carried out by Soldiers in a variety of heavily armored vehicles. Its main purpose is to patrol designated routes to give the area commander a high level of assurance that the route is safe for civilian and military vehicular traffic. On today's battlefield, this translates to finding and clearing the route of obstacles—including improvised explosive devices (IEDs)—to enable assured mobility.

The Operator, Leader, and Sapper Courses form the suite of route clearance courses taught at the CEHC. Initially, these were taught as individual courses, with the onus on home stations and the collective training centers to carry out collective training and bring together the various capabilities. However, with a higher operational tempo and reduced dwell times, there isn't time for commanders to follow the traditional cycle of training individually, then collectively, at platoon, company, and battalion levels. This caused the CEHC to examine its courses and make changes to assist commanders in the predeployment training of their Soldiers.

A Soldier prepares an explosive charge to place on a robot to blow an IED in place.



Training the Force

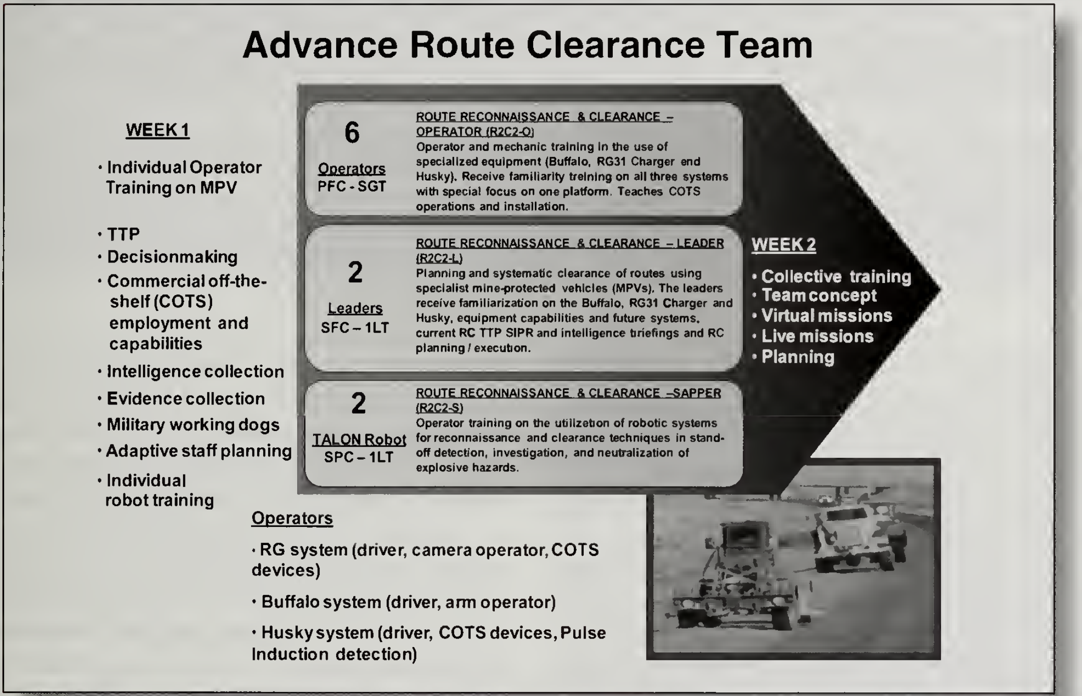
COURSE

- R2C2-Operator
- R2C2-Leader
- Husky Master Driver
- Virtual Training Suite
- R2C2-Sapper

- Intelligence Collection
- Evidence Collection
- Military Working Dogs
- Adaptive Staff Planning

Advanced Route Clearance Teams

Legend:
R2C2 - Route reconnaissance and clearance operations course



Advance Route Clearance Team

WEEK 1

- Individual Operator Training on MPV
- TTP
- Decisionmaking
- Commercial off-the-shelf (COTS) employment and capabilities
- Intelligence collection
- Evidence collection
- Military working dogs
- Adaptive staff planning
- Individual robot training

6 Operators PFC - SGT	ROUTE RECONNAISSANCE & CLEARANCE – OPERATOR (R2C2-O) Operator and mechanic training in the use of specialized equipment (Buffalo, RG31 Charger end Husky). Receive familiarity treining on all three systems with special focus on one platform. Teaches COTS operations and installation.
2 Leaders SFC – 1LT	ROUTE RECONNAISSANCE & CLEARANCE – LEADER (R2C2-L) Planning and systematic clearance of routes using specialist mine-protected vehicles (MPVs). The leaders receive familiarization on the Buffalo, RG31 Charger and Husky, equipment capabilities and future systems, current RC TTP SIPR and intelligence triefings and RC planning / execution.
2 TALON Robot SPC – 1LT	ROUTE RECONNAISSANCE & CLEARANCE –SAPPER (R2C2-S) Operator training on the utilzetion of robotic systems for reconnaissance and clearance techniques in stand-off detection, investigation, and neutralization of explosive hazards.

WEEK 2

- Collective training
- Team concept
- Virtual missions
- Live missions
- Planning

Operators

- RG system (driver, camera operator, COTS devices)
- Buffalo system (driver, arm operator)
- Husky system (driver, COTS devices, Pulse Induction detection)

Analysis of information from both current operational theaters and a series of interviews with deployed and redeploying units revealed that the members of route clearance patrols, although individually well-trained, sometimes struggled to receive an appropriate amount of home station and collective training. This resulted in Soldiers who were competent in their own responsibilities, but struggled to understand the capabilities of the other members of the patrol. The decision was made to combine the three courses to allow cross-pollination of training. This combined training approach to route clearance is not collective training, but an introduction to the host of capabilities present at the patrol level. This is advantageous for the Soldiers, since they are introduced at an early stage to the capabilities of their battle buddies. It is crucial for commanders, since they get an opportunity to plan a route clearance patrol, issue orders, and "deploy" their Soldiers to carry out a mission as a formed team.

Operator Course. This training is aimed at Soldiers in ranks from privates to sergeants and focuses on detecting, investigating, marking, reporting, and neutralizing explosive hazards using the Buffalo, Husky, and RG-31 Charger mine-resistant, ambush-protected (MRAP) vehicles. In order to gain an in-depth knowledge of how to operate and drive the Husky simultaneously, the Husky students are separated during the first week. The remaining students focus on the other two vehicles, learning to drive and operate the equipment to the required standard.

Leader Course. This training is aimed at Soldiers in the rank of sergeant first class to first lieutenant. It focuses on the planning and command and control (C2) of a patrol. Students

A Husky (front) and an RG-31 set off on a route clearance patrol.

learn to conduct a threat assessment of the battlefield; mission-planning, orders and rehearsals; and execution of realistic missions.

Sapper Course. This course includes Soldiers in the ranks of specialist to first lieutenant. Students learn to operate the TALON® robot, allowing them to identify explosive hazards and understand the threat they pose. Their training then guides them through a series of questions that allows them to assess whether or not they can neutralize the hazard without requesting assistance.

Each of the three courses lasts 80 hours over a two-week residential period at Fort Leonard Wood. During the first week, the three courses run simultaneously, but with a degree of separation. This allows students to concentrate on their particular responsibilities and become proficient in their own disciplines. The second week brings together the operators and leaders to allow commanders to plan and execute a mission with their own Soldiers. The Virtual Training Suite is also introduced during this period to let commanders and leaders practice their own platoon-level TTP and C2. The ability to rerun missions in the virtual environment gives commanders the opportunity to mission-rehearse their Soldiers until they all understand what to do in different circumstances. During this phase, Soldiers conduct "real" missions on the equipment, giving them an opportunity to hone their personal operator and driver skills, while simultaneously giving commanders a chance to plan and execute a mission with the Soldiers they will deploy with. The Sappers are then introduced, giving the route clearance patrol the ability to deal with explosive hazards with the vehicles and remotely, from a standoff distance, using robots.

Possible Future Improvements

Combining these three courses allows commanders to improve predeployment training by giving their platoons an opportunity to practice individual and platoon-level skills in the training environment. The COE is ever-changing, with the enemy adapting daily to our TTP. Likewise, the CEHC has also adapted to attempt to close the gap between our training and the actions of our enemies. As such, the new training will not remain static. Plans are in the pipeline to introduce dog handlers to the courses to give commanders that extra ability to confirm or deny the presence of an explosive hazard.

The need for an evidence collection capability to "fight the network" has also been highlighted, and the feasibility of introducing this to one of the courses is under study. The development of commanders and leaders cannot be ignored either. Today's battlefield requires adaptive thinkers who are not merely trained in TTP, but who are educated. Commanders and leaders are required who think like the enemy, who remain unpredictable and who constantly change how they reflect the COE. These are all future aspirations to maintain constant upgrading so that courses at the CEHC remain relevant to our operational theaters.

Major Coats was commissioned into the Royal Engineers from the Royal Military Academy Sandhurst in 1999. He commanded at Troop level in Northern Ireland and England before taking up the post of Regimental Intelligence Officer and subsequently a Squadron Second-in-Command post in Germany. Following two tours of Iraq, he was promoted to Major, attended the Intermediate Command and Staff College, then took up the post of Chief Future Plans at the Counter Explosive Hazards Center, Fort Leonard Wood, Missouri.

Mr. Jackson enlisted in the Georgia National Guard as a combat engineer in 1975. After completing his basic and advanced individual training at Fort Leonard Wood, he enlisted in the Regular Army. Over a 30-year career, he served in leadership positions ranging from team leader to command sergeant major. He now serves as Chief, Training Support Division at the Counter Explosive Hazards Center.

IED Defeat Gated Training Strategy

A Holistic Approach to Preparing Units and Soldiers for Combat

By Colonel Kenneth J. Crawford

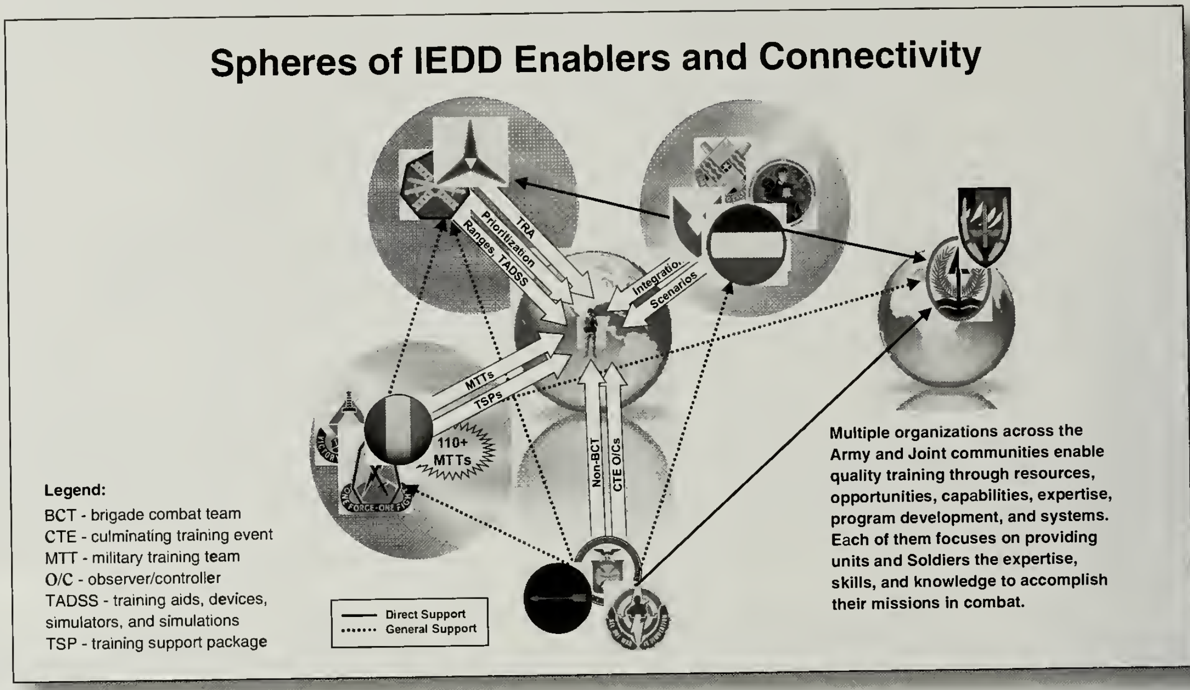
Warfighters and leaders across the United States Army often face the same challenge as they create and execute their directed mission-essential task list (DMETL) training. Once they receive orders for deployment, their interests quickly adjust to their future operating environment and the threats therein. The most common and lethal threat experienced on today's battlefield is the improvised explosive device (IED).

Of the 4,865 fallen warriors in Operation Iraqi Freedom and Operation Enduring Freedom,[1] 3,830[2] are a result of hostile action, and 2,350—or 61.4 percent—are the direct result of an IED.[3] Thousands more have been wounded by the devices. These deadly IEDs consist of various types and configurations of explosives, munitions, triggers, and arming and firing methods. However, there is one constant element—it took an enemy to design, finance, manufacture, transport, emplace, arm, and (sometimes) detonate an extremely lethal device against our fellow warriors. The purpose of this article is to furnish leaders and resource providers with a holistic and practical approach to prepare and train Soldiers and units for combat. Specifically, it is meant to provide a methodical approach along the three lines of operation laid out by the Joint IED Defeat Organization (JIEDDO),[4] which calls for—

- Defeating the device.
- Attacking the network.
- Training the force.

Photo by Sergeant First Class Kap Kim

IED defeat skills are important for Soldiers whether mounted or on foot.


Spheres of IEDD Enablers and Connectivity

Legend:
BCT - brigade combat team
CTE - culminating training event
MTT - military training team
O/C - observer/controller
TADSS - training aids, devices, simulators, and simulations
TSP - training support package

Multiple organizations across the Army and Joint communities enable quality training through resources, opportunities, capabilities, expertise, program development, and systems. Each of them focuses on providing units and Soldiers the expertise, skills, and knowledge to accomplish their missions in combat.

Figure 1

The readily available and supporting Joint Center of Excellence at Fort Irwin, California, supports training warfighters by "validating and propagating IED defeat (IEDD) tactics, using [tactics,] techniques and procedures (TTP) and lessons learned from theater."[5] The primary outlet for this expertise is found in our combat training centers (CTCs), which provide units with a wealth of experience and resources in a hyper-realistic training environment. The challenge is providing this quality of training experience across the Army for all deploying forces at home and mobilization stations for all Regular Army and Reserve Component forces.

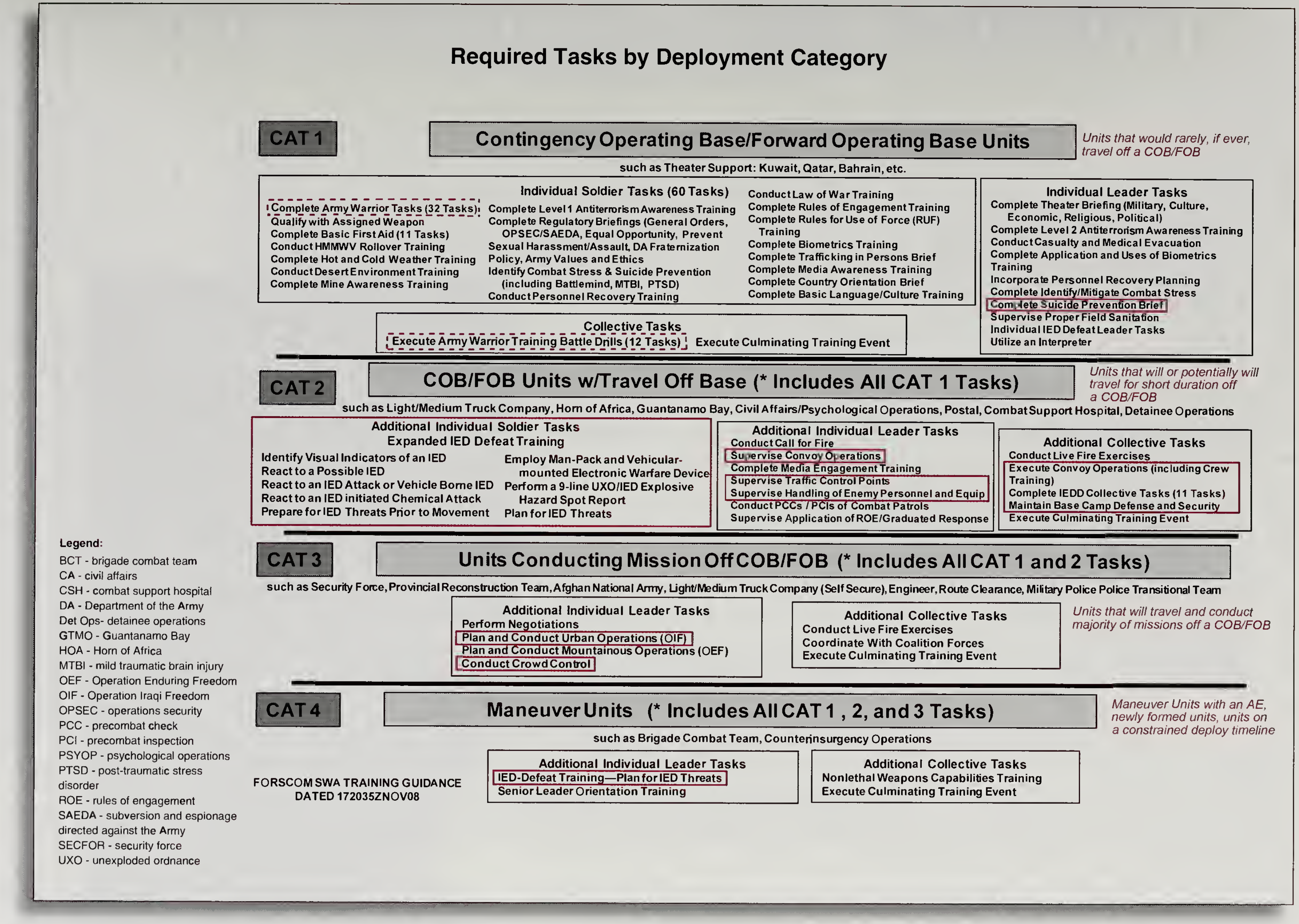
Providing Quality Training

A systematic approach to providing Soldiers and units with the quality of training they deserve is to harness the resources of our installations—facilities; ranges; training aids, devices, simulators, and simulations [TADSS]—and the expertise of specific organizations such as JIED-DO, the Asymmetric Warfare Group (AWG), the United States Army Training and Doctrine Command's IEDD Integrated Capabilities Development Team, and Forces Command's IEDD Integration Cells. These are used in a gated training strategy (GTS) similar to the one used to conduct Bradley Fighting Vehicle and tank gunnery tables. (See Figure 1 for the interrelated resource providers for home station training.) The solution isn't simple and will require vigilance to maintain relevance as our tactical environments and enemy TTP change. Every unit leader's intent is to develop and resource the training that will best prepare their Soldiers for what they may experience downrange. Rather than complicating resource requirements, the IEDD community must enable the chain of command, which has the ultimate responsibility (inherent within senior commanders' training and readiness authority [TRA]) for preparing Soldiers and units for deployment. The cascading complexity of efficiently coordinating the resources for a senior commander requires a dedicated and focused effort to provide support to all units training at home station. Essentially, this is commanders' business and commanders must have the ability to use resources to meet their common challenge, which is the absence of a standard, relevant, and current approach to training IEDD at the individual through collective levels.

Structuring and Planning the GTS

Structuring a way to overcome this challenge through live, virtual, and constructive (LVC) training to produce a CTC-like experience at home station lets leaders and units hone their skills, battle drills, and TTP before certification and deployment. In essence, the leaders and units will arrive at the CTC or their deployed destination with heightened levels of competency and ability. The GTS is not a catchall approach for training on all predeployment tasks, but focuses on IEDD and its supporting or interrelated tactical tasks. Given the high probability that IEDs will remain a weapon of choice for our enemies in future conflicts, our IEDD training must be adaptive, structured, and holistic.

Soldiers are at risk of encountering IEDs while deployed, and their probability of encountering them depends on their unique operational environment. To effectively synchronize our IEDD GTS, we must prioritize the competing demands for resources and dovetail the hierarchy of training requirements with the training tasks in the four categories articulated in FORSCOM's Southwest Asia (SWA) Training Guidance[6] in November 2008—(see Figure 2, page 33). The GTS focuses the specific individual, leader, and collective IEDD training tasks (outlined in red boxes in Figure 2), builds upon each training experience,



Required Tasks by Deployment Category

CAT 1 — **Contingency Operating Base/Forward Operating Base Units**

Units that would rarely, if ever, travel off a COB/FOB

such as Theater Support: Kuwait, Qatar, Bahrain, etc.

Individual Soldier Tasks (60 Tasks)

- Complete Army Warrior Tasks (32 Tasks)
- Qualify with Assigned Weapon
- Complete Basic First Aid (11 Tasks)
- Conduct HMMWV Rollover Training
- Complete Hot and Cold Weather Training
- Conduct Desert Environment Training
- Complete Mine Awareness Training
- Complete Level 1 Antiterrorism Awareness Training
- Complete Regulatory Briefings (General Orders, OPSEC/SAEDA, Equal Opportunity, Prevent Sexual Harassment/Assault, DA Fraternization Policy, Army Values and Ethics
- Identify Combat Stress & Suicide Prevention (including Battlemind, MTBI, PTSD)
- Conduct Personnel Recovery Training
- Conduct Law of War Training
- Complete Rules of Engagement Training
- Complete Rules for Use of Force (RUF) Training
- Complete Biometrics Training
- Complete Trafficking in Persons Brief
- Complete Media Awareness Training
- Complete Country Orientation Brief
- Complete Basic Language/Culture Training

Individual Leader Tasks

- Complete Theater Briefing (Military, Culture, Economic, Religious, Political)
- Complete Level 2 Antiterrorism Awareness Training
- Conduct Casualty and Medical Evacuation
- Complete Application and Uses of Biometrics Training
- Incorporate Personnel Recovery Planning
- Complete Identify/Mitigate Combat Stress
- Complete Suicide Prevention Brief
- Supervise Proper Field Sanitation
- Individual IED Defeat Leader Tasks
- Utilize an Interpreter

Collective Tasks

- Execute Army Warrior Training Battle Drills (12 Tasks)
- Execute Culminating Training Event

CAT 2 — **COB/FOB Units w/Travel Off Base (* Includes All CAT 1 Tasks)**

Units that will or potentially will travel for short duration off a COB/FOB

such as Light/Medium Truck Company, Horn of Africa, Guantanamo Bay, Civil Affairs/Psychological Operations, Postal, Combat Support Hospital, Detainee Operations

Additional Individual Soldier Tasks
Expanded IED Defeat Training

- Identify Visual Indicators of an IED
- React to a Possible IED
- React to an IED Attack or Vehicle Borne IED
- React to an IED initiated Chemical Attack
- Prepare for IED Threats Prior to Movement
- Employ Man-Pack and Vehicular-mounted Electronic Warfare Device
- Perform a 9-line UXO/IED Explosive Hazard Spot Report
- Plan for IED Threats

Additional Individual Leader Tasks

- Conduct Call for Fire
- Supervise Convoy Operations
- Complete Media Engagement Training
- Supervise Traffic Control Points
- Supervise Handling of Enemy Personnel and Equip
- Conduct PCCs / PCIs of Combat Patrols
- Supervise Application of ROE/Graduated Response

Additional Collective Tasks

- Conduct Live Fire Exercises
- Execute Convoy Operations (including Crew Training)
- Complete IEDD Collective Tasks (11 Tasks)
- Maintain Base Camp Defense and Security
- Execute Culminating Training Event

CAT 3 — **Units Conducting Mission Off COB/FOB (* Includes All CAT 1 and 2 Tasks)**

such as Security Force, Provincial Reconstruction Team, Afghan National Army, Light/Medium Truck Company (Self Secure), Engineer, Route Clearance, Military Police Police Transitional Team

Units that will travel and conduct majority of missions off a COB/FOB

Additional Individual Leader Tasks

- Perform Negotiations
- Plan and Conduct Urban Operations (OIF)
- Plan and Conduct Mountainous Operations (OEF)
- Conduct Crowd Control

Additional Collective Tasks

- Conduct Live Fire Exercises
- Coordinate With Coalition Forces
- Execute Culminating Training Event

CAT 4 — **Maneuver Units (* Includes All CAT 1 , 2, and 3 Tasks)**

Maneuver Units with an AE, newly formed units, units on a constrained deploy timeline

such as Brigade Combat Team, Counterinsurgency Operations

Additional Individual Leader Tasks

- IED-Defeat Training—Plan for IED Threats
- Senior Leader Orientation Training

Additional Collective Tasks

- Nonlethal Weapons Capabilities Training
- Execute Culminating Training Event

FORSCOM SWA TRAINING GUIDANCE
DATED 172035ZNOV08

Legend:

- BCT - brigade combat team
- CA - civil affairs
- CSH - combat support hospital
- DA - Department of the Army
- Det Ops- detainee operations
- GTMO - Guantanamo Bay
- HOA - Horn of Africa
- MTBI - mild traumatic brain injury
- OEF - Operation Enduring Freedom
- OIF - Operation Iraqi Freedom
- OPSEC - operations security
- PCC - precombat check
- PCI - precombat inspection
- PSYOP - psychological operations
- PTSD - post-traumatic stress disorder
- ROE - rules of engagement
- SAEDA - subversion and espionage directed against the Army
- SECFOR - security force
- UXO - unexploded ordnance

Figure 2

and culminates in the unit's ability to systematically defeat the device and attack the network.

The construct of the IEDD GTS takes into account the following considerations:

- It must be scalable to meet the desired training objectives from platoon to brigade level. The strategy must have the ability to be tailored to a unit's mission and experience level. Commanders must tailor the concept to fit current unit training levels, especially for a combat-experienced force; the start point for training may not always be the "crawl" stage. As units head into the next higher level's training event, they must prepare accordingly. As units prepare for major combat operations gunnery, a crew is expected to execute specific tasks before operating as part of a section or platoon; platoons must master specific tasks before executing company-level operations; and companies and battalions must be able to effectively maneuver and mass firepower to support battalion- and brigade-level operations. The nesting of IEDD GTS is similar with the underlying objectives of defeating the device and maneuvering on and attacking the network.
- The training, enemy and friendly TTP, available TADSS, terrain and environment, and systems employed must be relevant and current. We should train with the same systems and platforms Soldiers will operate downrange to reduce the initial risks associated with learning while being engaged. It is absolutely necessary to field our platforms and systems first to those in the fight. To train effectively on similar systems, we can create surrogates and mock-ups to achieve the desired effects until we field the actual systems at our home stations.
- We must ensure that our doctrine and knowledge management remain relevant, current, dynamic, and adaptive to the changing threat abroad. JIEDDO provides outstanding references and resources for LVC training applications through the Knowledge and Information Fusion Exchange (KnIFE). The primary purpose of KnIFE is "to exchange information, consolidate best practices, and respond to requests for information (RFIs) related to the asymmetric application of ... (TTP) by both enemy and friendly forces."[7] The KnIFE website provides leaders and units with a wealth of information to enable quality training. Keeping our doctrine current is a significant challenge. Our existing doctrine is a reference that we must expand into our digital knowledge management databases to allow the Army to remain current until the release of the next printed revision. The constantly changing conditions and operating environments mandate a requirement to have both a baseline printed reference and an individual, dynamic online database of information to maintain relevance for the warfighter's training.

We must provide and resource the most realistic training for our Soldiers to immerse them in the environment they'll operate in abroad. The structures, civilians, smells, and sounds experienced by individual Soldiers and units serve to help "inoculate" and prepare them to instinctively respond to conditions they might encounter while deployed.

IEDD "Gunnery"

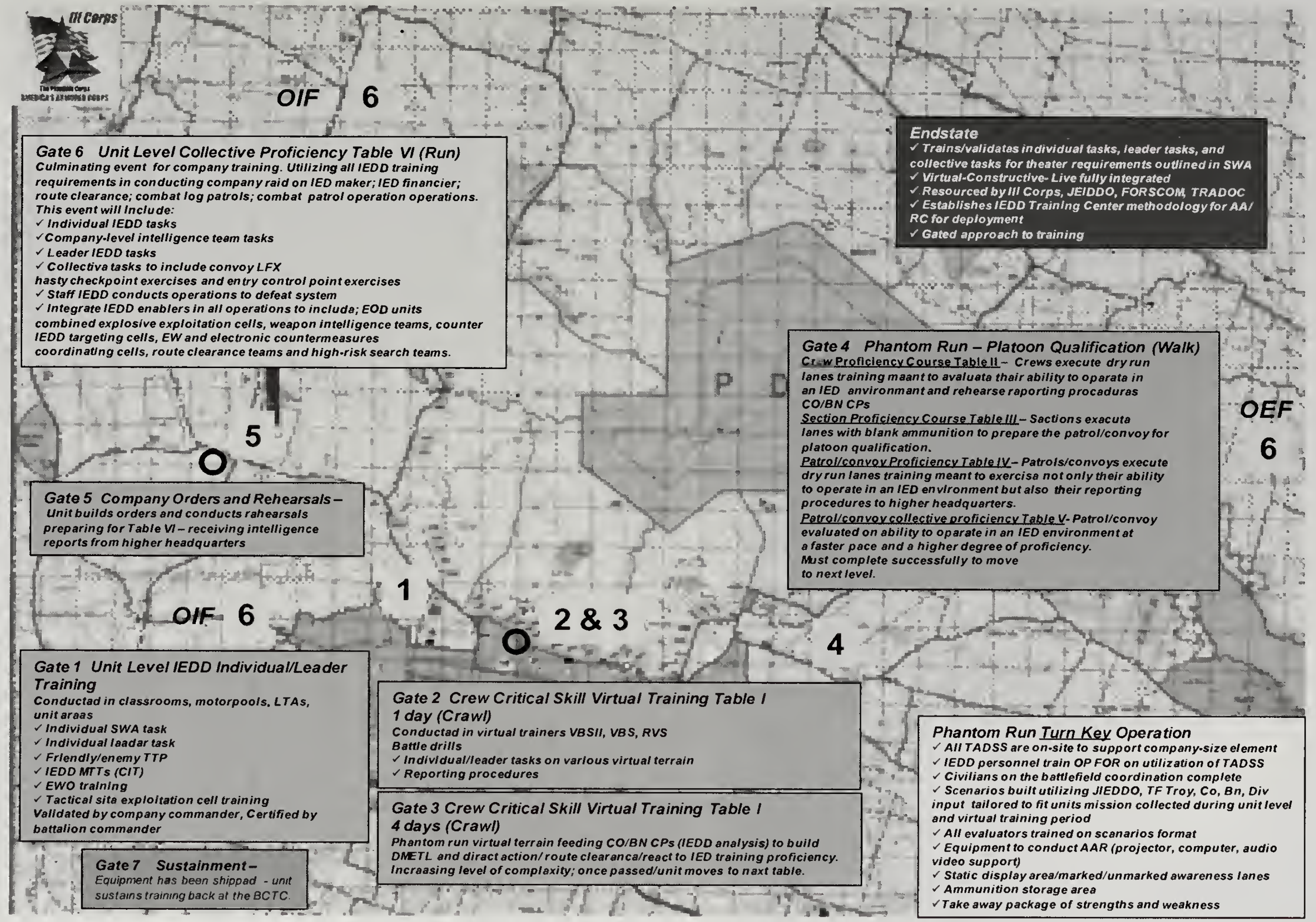
The IEDD GTS is a holistic approach to training everything from individual Soldiers to brigade-size units to defeat the device and attack the network. The overarching intent is to ensure that units understand and can effectively analyze the complexity of the IEDD fight. The IEDD GTS provides this by creating gates where individuals and units must successfully accomplish specific training objectives to standard before moving to the next higher and more complex gate. The structure of the IEDD GTS includes tables similar to Bradley Fighting Vehicle and tank gunnery tables and is focused on specific unit levels (see Figure 3, page 35).

Gate 1 establishes a baseline to ensure that every individual, crew, and squad can successfully execute the common individual and leader training tasks. It also guarantees that they possess a common frame of reference based on FORSCOM training guidance, doctrine, unit standing operating procedures (SOPs), and current enemy and friendly TTP. KnIFE's training

Photo by Sergeant First Class Kap Kim

The environments where IEDs are encountered range from rural to inner-city slums. Knowing local residents is just as important as knowing TTP and Army systems.

IEDD Gated Training Strategy Concept (Live-Virtual-Constructive)



Gate 6 Unit Level Collective Proficiency Table VI (Run)
Culminating event for company training. Utilizing all IEDD training requirements in conducting company raid on IED maker; IED financier; route clearance; combat log patrols; combat patrol operation operations.
This event will Include:
- ✓ Individual IEDD tasks
- ✓ Company-level intelligence team tasks
- ✓ Leader IEDD tasks
- ✓ Collective tasks to include convoy LFX hasty checkpoint exercises and entry control point exercises
- ✓ Staff IEDD conducts operations to defeat system
- ✓ Integrate IEDD enablers in all operations to include; EOD units combined explosive exploitation cells, weapon intelligence teams, counter IEDD targeting cells, EW and electronic countermeasures coordinating cells, route clearance teams and high-risk search teams.

Gate 5 Company Orders and Rehearsals –
Unit builds orders and conducts rehearsals preparing for Table VI – receiving intelligence reports from higher headquarters

Gate 1 Unit Level IEDD Individual/Leader Training
Conducted in classrooms, motorpools, LTAs, unit areas
- ✓ Individual SWA task
- ✓ Individual leader task
- ✓ Friendly/enemy TTP
- ✓ IEDD MTTs (CIT)
- ✓ EWO training
- ✓ Tactical site exploitation cell training

Validated by company commander, Certified by battalion commander

Gate 7 Sustainment –
Equipment has been shipped - unit sustains training back at the BCTC.

Gate 2 Crew Critical Skill Virtual Training Table I
1 day (Crawl)
Conducted in virtual trainers VBSII, VBS, RVS
Battle drills
- ✓ Individual/leader tasks on various virtual terrain
- ✓ Reporting procedures

Gate 3 Crew Critical Skill Virtual Training Table I
4 days (Crawl)
Phantom run virtual terrain feeding CO/BN CPs (IEDD analysis) to build DMETL and direct action/ route clearance/react to IED training proficiency. Increasing level of complexity; once passed/unit moves to next table.

Gate 4 Phantom Run – Platoon Qualification (Walk)
Crew Proficiency Course Table II – Crews execute dry run lanes training meant to evaluate their ability to operate in an IED environment and rehearse reporting procedures CO/BN CPs
Section Proficiency Course Table III – Sections execute lanes with blank ammunition to prepare the patrol/convoy for platoon qualification.
Patrol/convoy Proficiency Table IV – Patrols/convoys execute dry run lanes training meant to exercise not only their ability to operate in an IED environment but also their reporting procedures to higher headquarters.
Patrol/convoy collective proficiency Table V- Patrol/convoy evaluated on ability to operate in an IED environment at a faster pace and a higher degree of proficiency.
Must complete successfully to move to next level.

Endstate
- ✓ Trains/validates individual tasks, leader tasks, and collective tasks for theater requirements outlined in SWA
- ✓ Virtual-Constructive- Live fully integrated
- ✓ Resourced by III Corps, JEIDDO, FORSCOM, TRADOC
- ✓ Establishes IEDD Training Center methodology for AA/ RC for deployment
- ✓ Gated approach to training

Phantom Run Turn Key Operation
- ✓ All TADSS are on-site to support company-size element
- ✓ IEDD personnel train OP FOR on utilization of TADSS
- ✓ Civilians on the battlefield coordination complete
- ✓ Scenarios built utilizing JIEDDO, TF Troy, Co, Bn, Div input tailored to fit units mission collected during unit level and virtual training period
- ✓ All evaluators trained on scenarios format
- ✓ Equipment to conduct AAR (projector, computer, audio video support)
- ✓ Static display area/marked/unmarked awareness lanes
- ✓ Ammunition storage area
- ✓ Take away package of strengths and weakness

Legend:
BN - battalion
CIT - capabilities integration team
CO - company
CP - command post
EOD - explosive ordnance disposal
EW - electronic warfare
EWO - electronic warfare officer
LTA - local training area
MTT - military training teams
RVS - reconfigurable vehicle simulator
VBSVBSII - Virtual Battle Simulation/Virtual Battle Simulation II

Figure 3

Photo by Colonel Kenneth J. Crawford

As the sun sets over Baghdad, a Buffalo crewmember prepares for a night mission.

resources can enhance unit capabilities when Soldiers attend courses, participate in distance learning, or apply the training support packages available for download. Similar to the gunnery skills tests, commanders certify that individuals and crews are ready to begin the LVC training tables outlined in the IEDD GTS before allowing crews to move into Table I (Crew Skills Virtual Training).

> ***"We must provide and resource the most realistic training for our Soldiers to immerse them in the environment they'll operate in abroad ... and prepare them to instinctively respond to conditions they might encounter while deployed."***

Table I

Table I includes *Gate 2* and *Gate 3*, which build on previously gained experiences and knowledge. Unit training is applied and refined through virtual training with simulators and simulations to validate the TTP units will adopt in their SOPs for tactical operations. The focus of Table I is to ensure that crews can effectively perform individual and leader tasks in virtual terrain, provide proper contact reports, and successfully execute crew battle drills, such as rollover drills using the high-mobility, multipurpose wheeled vehicle (HMMWV) egress assistance trainer (HEAT). *Gate 2* is executed in generic virtual terrain and includes graduated skill levels. Once crews successfully meet the standards of performance, they pass into the second half of Table I *(Gate 3)*, which provides a more complex and realistic training experience for the crew and unit. The simulated terrain replicates actual terrain they will encounter in Tables II to V. At this point, the scenario provides a comprehensive experience from the individual crew up to the battalion and brigade commander and staff levels. This takes advantage of the way units manage, report, synthesize, and analyze reports and information for future decisions and action. Every report from Table I to VI (collective proficiency) is meaningful, eventually leading to the ultimate objective of successfully "attacking the network" and ensuring a holistic training experience.

Tables II to V

Platoons normally serve as the lowest level called on to execute patrols in a combat environment. Thus, Tables II to V build to platoon-level proficiency in live scenarios with a crawl-walk-run approach. Crews, sections, and platoons execute their mission and focus on their ability to operate in a combat environment, defeat the effects of IEDs, and submit effective reports as staffs analyze the reports and build actionable intelligence for direct action. Platoon leaders execute one or more missions, similar to what they could experience while deployed. Missions might include—

- Mounted or dismounted navigation.
- Tactical questioning.
- Reaction to contact.
- Establishment of traffic control points.
- Crowd control.
- Detainee operations.
- Other tasks, depending on training objectives selected from FORSCOM training guidance.

The crews, sections, and platoons encounter a hyperrealistic environment while responding to civilian role-players, enemy elements, urban structures, and other battlefield effects that replicate indirect and direct fire, IEDs, and homemade explosives. Once platoons meet the training standards of Table V *(Gate 4)* and the battalion or brigade establishes the IED network hierarchy and probable locations, the company gets orders to prepare to execute lethal operations. Since operations may be led by U.S., combined, or host nation forces, additional complexities and considerations may be included, based on the theater of operations, the established rules of engagement, or the status of forces agreement.

Table VI

Table VI *(Gate 5* and *Gate 6)* focuses on company-level planning, rehearsals, operations, and mission execution. Once all the platoons of a company successfully pass through *Gate 4*, the company receives its mission and begins troop-leading procedures on their forward operating base. On order, the company executes a direct-action mission to destroy or defeat the network by a raid, a cordon-and-search operation, or destruction. Depending on the available training terrain, Table VI could culminate in a combined arms live-fire exercise (LFX) on a multipurpose range complex where battalion and brigades can integrate combat multiplier resources, such as tactical unmanned aerial vehicles (TUAVs), precision fires, or attack aviation.

As units approach their deployment date and ship their equipment, the availability and application of simulations helps them sustain their skill sets and capabilities. *Gate 7* focuses on sustaining these skills and enables the training of Soldiers who arrive after a unit has finished its CTC rotation and shipped its equipment (normally 60 days before the unit's scheduled latest arrival date). These same Soldiers reap the benefits of the unit's training and quickly learn "what right looks like" as they study their unit's TTP and SOPs before deployment.

Figure 3 lays out the IEDD GTS as it is being developed at Fort Hood, Texas. The intent is for all units to have access to world-class home-station IEDD training facilities that enable them to successfully accomplish the desired DMETL tasks and deploy with validated TTP and SOPs. Due to shortened dwell times and the fact that not every type of unit can deploy to a CTC, these resources and training strategy enable units to attain readiness more quickly at their home stations. Additionally, this training can be integrated as part of a battalion or brigade combat team's gunnery scheme of maneuver with minimal effort and resource overhead. The commonality of training tasks and threat allows the Army to adopt the IEDD GTS concept and apply it across every installation for Regular Army and Reserve Component training.

The Desired Effect

The IEDD GTS allows units to build on realistic training scenarios to "defeat the device" as they execute missions and provide reports to battalion and brigade tactical operation centers in virtual and live environments. Staffs synthesize the information gained from the reports into actionable intelligence and build target decks, as well as develop and direct missions, and commanders decide how and when to "attack the network" as they will during deployment. The outcome—or desired training effect—is a unit that is fully trained to operate, adapt, and decisively act in an extremely lethal environment with positive results. Units will deploy well-trained, able to defeat the device, and able to successfully attack the network.

Colonel Crawford is the Assistant Chief of Staff G5 (Plans, Exercises, and Training) at III Corps, Fort Hood, Texas. Earlier assignments include combat tours during Operations Desert Shield and Desert Storm, Operation Continue Hope in Somalia, and two deployments during Operation Iraqi Freedom. He is a selectee for the Senior Service College as a Fellow at the University of Texas Institute of Advanced Technology. He holds a master's in engineering management from the University of Missouri–Rolla (now Missouri University of Science and Technology).

Endnotes

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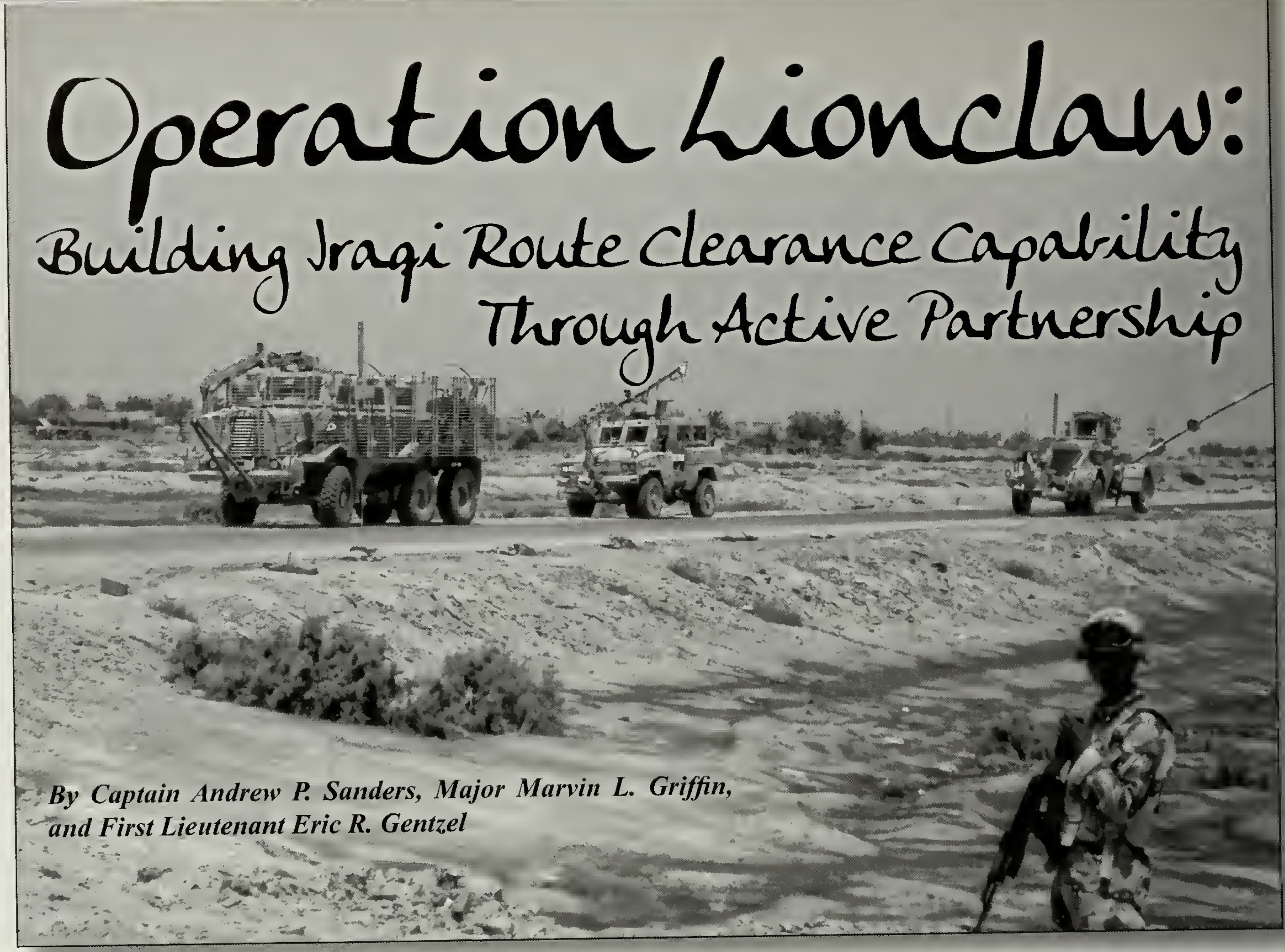
Operation Lionclaw:

Building Iraqi Route Clearance Capability Through Active Partnership



By Captain Andrew P. Sanders, Major Marvin L. Griffin, and First Lieutenant Eric R. Gentzel

During the past several months, U.S. and coalition forces have become increasingly focused on transition. Over time, as U.S. forces draw down in Iraq, the Iraqi Army (IA) will be required to expand its capabilities. For example, the No. 1 threat to both coalition and Iraqi forces continues to be the improvised explosive device (IED), which makes route clearance teams (RCTs) necessary. Since the current Iraqi Army modified table of organization and equipment (MTOE) only authorizes one engineer company for each division, and since a division's operational environment typically covers 5,000 square kilometers in southern Iraq, more Iraqi RCTs will be needed to meet the threat.

Recognizing the capability gap within the Iraqi formation, the 4th Brigade Special Troops Battalion (BSTB), 3d Infantry Division—along with Echo Company, 3-7 Infantry, and the 760th Explosive Ordnance Disposal (EOD) Company—developed Operation Lionclaw to build Iraqi route clearance capability in the 8th Iraqi Army Division by transforming Iraqi infantry platoons into RCTs at the brigade level. The operation was named after the symbol of the Babil Province, the Lion of Babylon, and Iron Claw, the name of many U.S. RCTs. Operation Lionclaw consisted of four critical pieces: manning, equipping, training, and partnering. It would be necessary to successfully complete each of these parts to reach the ultimate goal of independent Iraqi route clearance operations coordinated by the Iraqi brigade.

Manning

The mobility support gap in the Iraqi Army became evident after conducting operations for six months, but we knew we could not build their capability without buy-in from our Iraqi partners. The 4-3 BSTB leader engagement team, in conjunction with the 31st Iraqi Army military transition team, led the discussion with the commander of the 31st Iraqi Army Brigade, who saw the importance of bringing route clearance capability to his brigade and assigned a platoon of Iraqi infantry forces from 2d Battalion, 31st Iraqi Army Brigade, to take the lead in Operation Lionclaw. Three more platoons followed—one each from the 1st, 3d, and 4th Battalions—and were to be handpicked by the battalion commanders of each respective battalion for this critical mission.

Equipping

Another key issue was determining the right equipment set for the Iraqi forces. The standard Iraqi Army route clearance vehicle is the Badger, a version of the mine-resistant, ambush-protected (MRAP) Cougar. With only four of these vehicles available for each Iraqi division, we were forced to develop alternatives. An American route clearance patrol includes a detection element, an interrogation element, and a security element. In a U.S. patrol, the detection element includes the Husky mine detection vehicle and the RG-31 MK III with self-protection adaptive roller kit (SPARK).

The Buffalo mine-protected clearance vehicle conducts interrogation, and the RG-31—or MRAP-type vehicles—provide security (see Figure 1). For the Iraqi Army, we would have to improvise. The initial plan was to use the Polish-built DZIK armored car as the platform for both the detection and interrogation by mounting a blower for detection and a ferret arm for interrogation. We would round out the patrol with an RG-31 with SPARK for detection and an Iraqi M1114 for security.

After an initial engineering and mechanical assessment, we determined that the DZIK would work to mount the blower, and we would mount the ferret arm on the mine roller mount, which our maintenance team designed and fabricated. Once the fabrication was complete, our initial equipment set was complete. The set included the RG-31 with SPARK, RG-31 with ferret arm, and the DZIK or M1114. We were now ready to train the Iraqi Army.

Training

The Lionclaw Academy at Forward Operating Base (FOB) Kalsu served as a 14-day cornerstone training event for the program, where Iraqi forces were trained on critical tasks that would allow them to operate with their U.S. counterparts. A U.S. route clearance platoon leader, enlisted squad leaders, and EOD Soldiers served as cadre. The first week consisted mostly of classroom instruction, in which the students were trained in areas of vehicle maintenance, vehicle recovery, patrolling, and mission briefings. An average day consisted of a classroom portion in the morning, followed by practical exercises in the afternoon.

During the second week of training, the students conducted "mock patrols" on a situational training exercise (STX) lane on the FOB. With help from the EOD Soldiers, the cadre set up inert IEDs and initiation systems common to our operating environment. The students drove the vehicles and operated the equipment themselves, looking for the suspected IEDs. This phase applied the crawl-walk-run method, with coalition forces assisting in the beginning, and ended with the Iraqi platoon conducting a certification STX patrol. Language was a challenge to the training, but with numerous translators assisting, it became easier each day. In addition, the cadre improved their Arabic language skills, enabling them to interact more comfortably with the students.

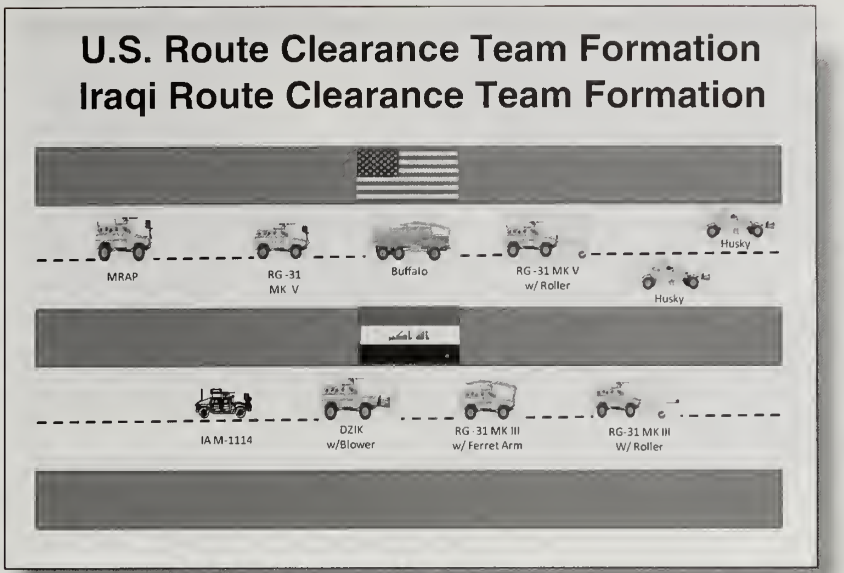

U.S. Route Clearance Team Formation
Iraqi Route Clearance Team Formation
MRAP
RG-31 MK V
Buffalo
RG-31 MK V w/ Roller
Husky
Husky
IA M-1114
DZIK w/Blower
RG-31 MK III w/ Ferret Arm
RG-31 MK III W/ Roller

Figure 1

Partnering

After the first Lionclaw platoon completed the initial 14-day training, we were ready to begin the partnership. Prior to Operation Lionclaw, other coalition units had conducted route clearance training with Iraqis in Baghdad and elsewhere. We took it a step further, including an aggressive partnership program with U.S. route clearance platoons. We were able to draw on other units' experience and programs of instruction as we developed the Lionclaw Academy, but partnership was uncharted territory. The first part of the partnership cycle had the U.S. platoon in the lead and included a leadership ride-along, rehearsals, and integrated patrols with

Iraqi Soldiers conduct a mock patrol in an RG-31 MK III with SPARK.

Iraqi Soldiers train on critical maintenance tasks.

the U.S. platoon (see Figure 2). The second part of the partnership cycle put the Iraqi Army in the lead and included rehearsals and combined patrols with the Iraqi platoon in the lead (see Figure 3). One of the U.S. route clearance platoons was designated the "partnership platoon" so that the operations were consistent and the platoon leadership could develop the personal relationship that is so critical to success in the Arab culture. The partnership expanded to include all platoons in the company as additional Iraqi platoons completed the Lionclaw Academy.

On the first day of the partnership, the Iraqi platoon leader and platoon sergeant conducted a ride-along with the U.S. platoon leader and platoon sergeant in a standard route clearance patrol. After the ride-along, we began work with the rest of the platoon. Some initial challenges were developing command and control tactics, techniques, and procedures (TTP) and combined battle drills. To meet these challenges, we broke the platoon into two sections, with each section conducting two days of instruction on battle drills and mounted rehearsals on the FOB. During the rehearsal days, the U.S. and Iraqi Army chains of command worked out the details of communications between the vehicles. Battle drills trained and rehearsed included IED found, IED interrogation, IED detonation, medical evacuation, and vehicle recovery. Iraqi forces were integrated into the security plan and all aspects of the battle drills.

After the rehearsals were completed on the FOB, the combined patrol was certified to conduct operations off the FOB. Each section conducted three days of combined patrols. The daily schedule included a combined intelligence update, rock drills, patrol briefing, the actual patrol, an after-action review (AAR), and lunch with the U.S. platoon at the mess hall. We started out with lower threat areas along multilane roads to allow the Iraqi Army to continue learning in a live environment. On these patrols, the Iraqi element conducted interrogation of suspected IEDs and served as part of the cordon during interrogation. After each mission, we conducted a combined AAR to glean the lessons for the day's operation and fine-tune command and control of the formation. After a week of combined patrolling by section, the conditions were set for the Iraqi Army to take the lead in partnership.

Iraqi-led patrolling began with rehearsals to refine TTPs and adjust the patrol to the new formation with the Iraqi platoon in the lead. With their proficiency proven in previous combined patrols, only one day of rehearsals was necessary. After final refinements and communications were set up, the patrols were ready to execute. As before, the patrols started off on a multilane highway with limited traffic, which allowed the Iraqis to navigate easily and focus more on the basics of route

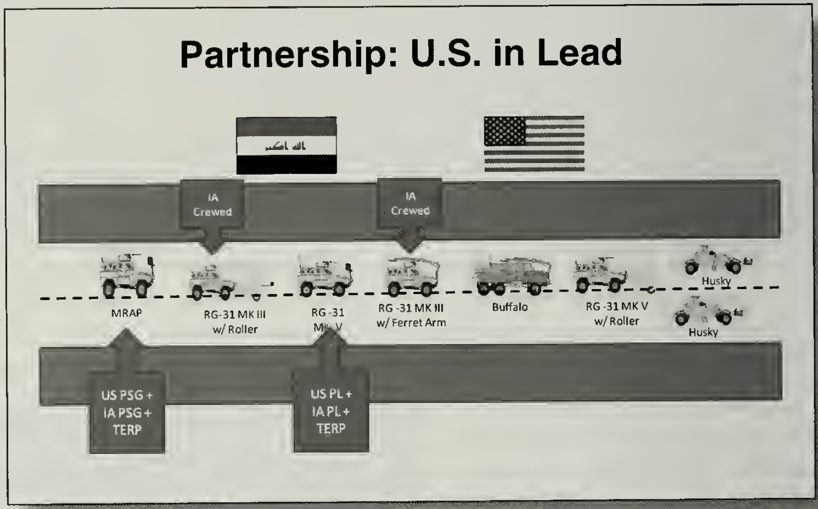


Figure 2

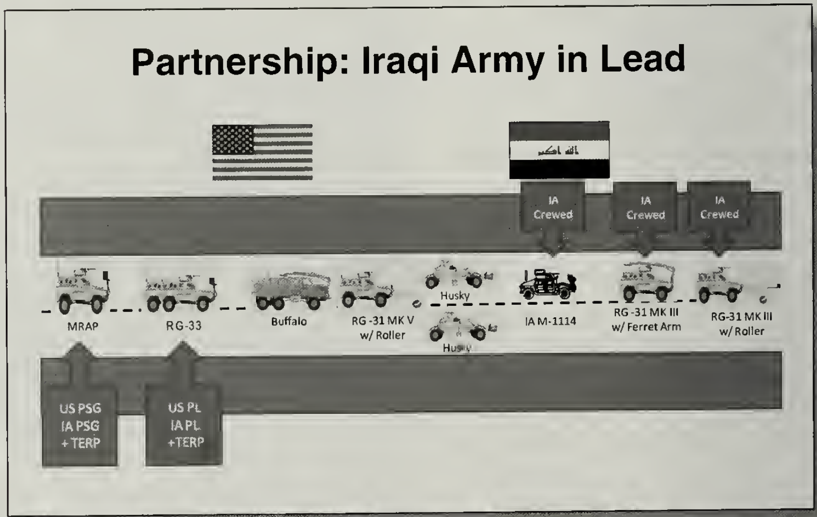


Figure 3

clearance rather than being concerned with civilian traffic in built-up areas. The Iraqi platoon leader was partnered with the U.S. platoon leader and rode in his vehicle. From here, the Iraqi platoon leader was able to both command and control his formation and coordinate with the U.S. patrol via the interpreter over the vehicle's internal AN/VIC-3 communications system. The Iraqi patrol's frequency was loaded on the second radio set, so the Iraqi platoon leader was able to use the AN/VIC-3 for both internal and external communications. This setup streamlined command and control of the patrol and allowed direct contact between the two patrol leaders.

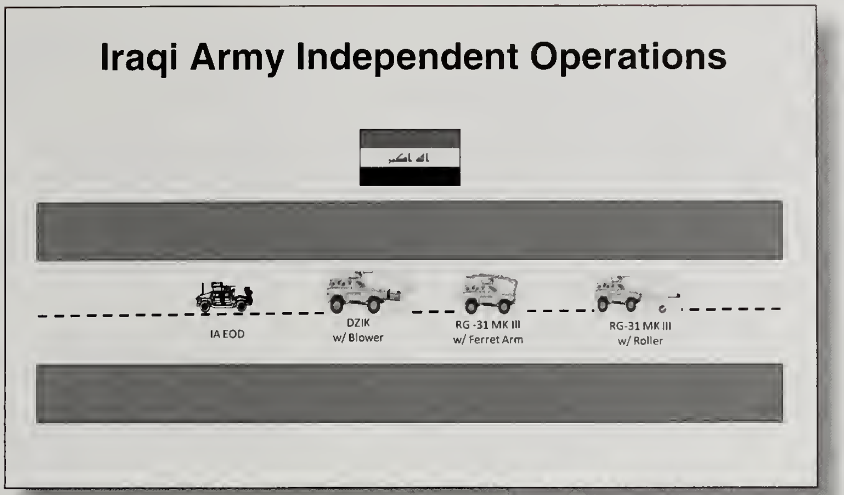


Figure 4

The platoons conducted five days of combined patrols with the Iraqi Army in the lead. These patrols progressed from relatively simple routes on a multilane highway to more difficult terrain. The "capstone" patrol was an Iraqi-led patrol through the congested towns of Haswah and Iskandariyah. The Iraqi Army's navigation and command and control skills were put to the test as they maneuvered through the challenging urban terrain.

Conclusion

Operation Lionclaw has been successful in building Iraqi Army capability, enabling combined operations and building the relationship between the Iraqi and the U.S. Armies. However, the Iraqi platoons cannot conduct independent operations until they are properly equipped. The ultimate goal for equipping would be one RG-31 MK III with the ferret arm, one with the SPARK, and one Iraqi DZIK or M1114 as a security vehicle (see Figure 4). The current challenge is that the RG-31 MK IIIs are still U.S. Army property and cannot be transferred to the Iraqi Army for independent use. Until the equipment can be transferred, or the Iraqi Ministry of Defense buys more sets of route clearance equipment, route clearance at the Iraqi Army battalion and brigade levels will be limited to combined patrols with U.S. platoons.

U.S. Soldiers lead a combined patrol brief.

Captain Sanders is the commander of Echo Company, 3-7 Infantry, deployed in support of Operation Iraqi Freedom. Previous assignments include sapper platoon leader, construction support platoon leader, and company executive officer with the 14th Engineer Battalion; assistant training and operations officer (S3) for reconstruction and assistant S3 plans with the 4th BSTB, 3d Infantry Division. He holds a bachelor's in civil engineering from the United States Military Academy and is an intern engineer in the state of New York. He is a graduate of the Sapper Leader Course and Airborne School.

Major Griffin is the executive officer of the 4th BSTB, 3d Infantry Division. Previous assignments include platoon leader, company executive officer, and assistant S3 with the 326th Engineer Battalion, 101st Airborne Division (Air Assault); assistant S3 and company commander with the 40th Engineer Battalion, 2d Brigade Combat Team, 1st Armored Division; and instructor/assistant professor in the Department of Civil and Mechanical Engineering at the United States Military Academy. He holds a bachelor's from the United States Military Academy and a master's in civil engineering from Georgia Institute of Technology and is a licensed professional engineer in the state of Missouri. He is a graduate of the Engineer Officer Advanced Course; Combined Arms Services and Staff School; Command and General Staff College; and Airborne, Air Assault, and Ranger Schools.

First Lieutenant Gentzel is the lead advisor/officer in charge for the Lionclaw Academy and is the support platoon leader in HHC, 4-3 BSTB, conducting EOD security missions in support of Operation Iraqi Freedom. As platoon leader for E/3-7 Infantry Battalion, he conducted route clearance operations in and around the Babil Province of Iraq from November 2007 to May 2008. Commissioned from the Officer Candidate School at Fort Benning, Georgia, he holds a bachelor's in telecommunications management from Ohio University.

The 766th Explosive Hazards Coordination Cell Leads the Way Into Afghanistan

By First Lieutenant Matthew D. Brady

On today's resource-constrained, high-turnover, asymmetric battlefield, assessing the threats and developing appropriate courses of action can present leaders with complex choices requiring analysis of second- and third-order effects. In a legacy battlefield like that in Afghanistan, threat analysis can become complicated due to the presence of explosive hazard remnants from decades of conflict. To synchronize the combat power and resources dedicated to reducing those hazards, a common operating picture is needed. The explosive hazards coordination cell (EHCC) helps develop the common operating picture and provides informational or situational understanding on explosive hazards to coalition forces to minimize coalition and civilian casualties.

New Type of Engineer Organization

The first EHCC to be deployed to Afghanistan in support of Operation Enduring Freedom was the 766th EHCC, Illinois Army National Guard. Its mission was to provide situational awareness on explosive hazards to coalition

Terrain such as this narrow pass in Afghanistan can limit the mobility of route clearance packages.

Many roads in Afghanistan are simply cut into the side of a mountain and may not bear the weight of heavy route clearance vehicles.

forces, the International Security Assistance Force (ISAF), and nongovernmental organizations to support stability operations in Afghanistan. The cell's Soldiers provided trend and pattern analysis, focusing on elements directly involved in the removal or reduction of explosive hazards. In addition, they observed, collected, wrote, published, and distributed route clearance information.

The EHCC is a new type of engineer organization that was first employed during Operation Iraqi Freedom. At its beginning in spring 2003, the EHCC was known as the Mine and Explosive Ordnance Information Coordination Cell (MEOICC). In its early days, it merged portions of a Mine Information Coordination Cell (MICC)—which tracked explosive hazards to coordinate safe military movement in mined areas and supported force protection through hazard awareness training—and a National Mine Action Authority (NMAA), which coordinates Mine Action Center (MAC) operations in regions where humanitarian demining operations are active. Since fall 2005, the organization has been known as the EHCC, and to date there have been four so-named rotations through Iraq. The EHCC in Afghanistan was first employed in spring 2008. In the past, EHCCs had been formed from elements of engineer battalion headquarters support companies. Doctrinal EHCCs began to be stood up in 2008 and will continue into 2011.

766th EHCC Partners

The 766th EHCC partnered with many organizations during its mission in Afghanistan. As an organic part of Combined Task Force (CTF) Castle, the EHCC supported Task Force (TF) Workhorse (Route Clearance) and TF Hammer (Construction) by providing them with explosive hazards awareness. Along with components of CTF Castle, the EHCC collaborated with the Combined Information Data Network Exchange (CIDNE); BuckEye, an airborne high-resolution geospatial collection system; Joint Task Force (JTF) Paladin, the counter improvised explosive device (C-IED) task force for Afghanistan; the MAC; and the Counter Explosive Hazards Center (CEHC) at the United States Army Engineer School, Fort Leonard Wood, Missouri.

TF Workhorse

Everything the EHCC produced was primarily focused on supporting TF Workhorse, which had the route clearance mission for Regional Command–East and portions of Regional Command–South. TF Workhorse led the way on route clearance operations all across Regional Command–East and proved to be a dominant player in the IED fight, involved in more than one-third of all IED events in its area. It excelled in adapting quickly to the ever-changing threat presented by the IED fight. Not only did the Soldiers incorporate the new technologies that were constantly offered to them, they came up with innovative ways to push their equipment to the limit—and sometimes beyond the original design concept.

Combined Information Data Network Exchange

The EHCC collaborated with CIDNE to improve the quality of reporting and helped to educate people on the importance of timely, accurate reporting. CIDNE is the database of record and provides users with the tools to support the diverse and complex processes contributing to the mission of coalition forces. It provides an information bridge between various communities which, while working the same problem sets from different perspectives, might not otherwise be able to share data. The Web-enabled Temporal Analysis System (WebTAS) is a flexible suite of generic analytical tools that allows organizations to quickly fuse, visualize, and interpret disparate sources of information, including databases, data streams, and other structured information. WebTAS is designed to help users uncover trends, patterns, and relationships in their data by providing a number of visualization options. Using WebTAS to mine the CIDNE database, the EHCC was able to obtain real-time data on explosive hazard events throughout the theater. This enabled them to create accurate and up-to-date explosive hazard overlays for analysis at both the tactical and operational levels.

BuckEye System Imagery

The EHCC worked with the BuckEye System to provide high-resolution geospatial data coupled with explosive hazard activity overlays so that Soldiers at the tactical level could have better situational awareness of explosive hazard activity in their area of operations. In 2006, the BuckEye System was deployed to Afghanistan to conduct intelligence, surveillance, and reconnaissance missions in support of Operation Enduring Freedom. The BuckEye System's digital color camera was combined with sensor data to collect high-resolution, high-accuracy elevation data. The EHCC used ArcGIS,™ a geospatial analysis program, to fuse the imagery and elevation data, pulled from the CIDNE database using WebTAS, to create a tailored operational picture. This was then used to create Portable Document Format (PDF) files that were small enough to be distributed in locations with limited or restricted bandwidth.

JTF Paladin Liaison Officer

The EHCC embedded a liaison officer with JTF Paladin to facilitate communications among EHCC, CTF Castle, TF Workhorse, Combined Joint Task Force 101, and ISAF soldiers employed in the C-IED fight. The liaison officer brought extensive knowledge of route clearance operations and the ability to navigate through both the CTF Castle and JTF Paladin organizations. This let the liaison officer distribute critical information to U.S. and coalition forces. He established an enhanced working relationship between TF Workhorse, the EHCC, and the JTF Paladin operations research/systems analysis section, science and technology advisors, C-IED Operations Integration Center, and Asymmetric Warfare Group. He also assisted the United States Army Materiel Command by helping coordinate the distribution of several C-IED technologies and initiatives. The liaison officer was able to engage members of ISAF from Regional Commands–East, –West, –North, –South, and –Capital to educate and inform them on what route clearance equipment is in operation by U.S. forces and how the ISAF can use this equipment to perform route clearance missions in their respective areas of operations. Polish, Italian, German, British, Canadian, and French soldiers were all aided by the liaison officer's knowledge of route clearance equipment and operations.

> ***"...assessing the threats and developing appropriate courses of action can present leaders with complex choices..."***

Mine Action Center

The EHCC worked with the MAC to coordinate minefield activity near coalition forces. The MAC for Afghanistan coordinates mine action activities in the country and operates under the auspices of the Relief, Recovery and Reconstruction Pillar of the United Nations Assistance Mission to Afghanistan. It is a program of the United Nations Mine Action Service, implemented by the United Nations Office for Project Services. Members of the EHCC staff were also integrated into the MAC itself. They provided geospatial map-making support to document the location of mine areas all across Afghanistan. They also participated in the supervision and quality assurance of the humanitarian demining efforts throughout the Afghanistan theater of operations.

Counter Explosive Hazards Center

The CEHC is the primary training source that the EHCCs use to track and analyze explosive hazards. The CEHC mission is to preserve the fighting force by—

- Providing explosive hazard training to deploying forces.
- Helping to identify and field viable countermeasures solutions and technologies.
- Developing the intellectual and situational superiority of combat units.

The Center provides predeployment training to all units assigned the EHCC mission. During its deployment, the 766th EHCC maintained contact with the CEHC and worked with it to continue to refine doctrinal concepts for both route clearance operations and the EHCC itself.

Mobile Observation Team

The EHCC also employed a mobile observation team (MOT), which conducted ride-along missions with the route clearance packages (RCPs) as specialized observers to collect and document the best practices being used by RCPs and to help distribute those tactics, techniques, and procedures (TTP) across the theater. As the team members moved from one area to another, they brought with them experiences gathered from route clearance missions with other RCPs. This mobility gave them a broader perspective on the C-IED fight than the typical RCP would have. In turn, this allowed the team members to recognize IED threats as they migrated into the areas of operation of different RCPs. As these threats spread across the theater, they could appear to be new techniques when encountered by an RCP for the first time, though the technique could be common in other parts of the theater. When the team members passed through, they helped RCPs counter the new threat by relaying experiences gathered from conducting missions with other units that had encountered the threat before. This allowed RCPs to discover how neighboring units were operating and learn from their collective experiences. Ultimately, this led TF Workhorse to create a strike after-action review to cross-level TTP after each significant activity.

Route Clearance Handbook

The MOT spent most of its time learning from TF Workhorse and bringing those route clearance concepts back to the EHCC for greater distribution. The team's mission culminated in the publication of a route clearance handbook, specific to Operation Enduring Freedom, documenting the successes of TF Workhorse and other RCPs operating in-theater. With the help of the Center for Army Lessons Learned, the EHCC will publish this handbook for widest distribution.

First Lieutenant Brady is scheduled to take command of the 631st Engineer Support Company, 766th Engineer Battalion. Previously an enlisted Soldier, he has served more than 6 years in the Army National Guard. He is a graduate of the Engineer Officer Basic Course and holds a bachelor's in civil engineering and a master's in structural engineering from the University of Illinois at Urbana-Champaign. He also holds a professional engineering license.

Note. The 766th EHCC was formed out of the Headquarters Support Company, 766th Engineer Battalion, Illinois Army National Guard. The EHCC worked closely with the route clearance battalion from TF Workhorse, which was formed from components of the 201st and 206th Engineer Battalions, Kentucky Army National Guard, and the 927th Sapper Company, Louisiana Army National Guard. TF Hammer was formed out of the 62d Engineer Battalion, United States Army, Fort Hood, Texas. The EHCC, TF Workhorse, and TF Hammer operated under the command of the Engineer Brigade, CTF Castle, which was formed out of the Headquarters and Headquarters Company, 420th Engineer Brigade, United States Army Reserve.

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Connelly, Corporal Brian M.	40th Engineer Battalion, 2d Brigade Combat Team	Baumholder, Germany
Cotting, Private First Class Grant A.	5th Engineer Battalion, 4th Maneuver Enhancement Brigade	Fort Leonard Wood, Missouri
Diamond, Staff Sergeant Sean D.	14th Engineer Battalion, 555th Engineer Brigade	Fort Lewis, Washington
Sam, Staff Sergeant Solomon T.	84th Engineer Battalion, 130th Engineer Brigade	Schofield Barracks, Hawaii
Savage, Sergeant John J.	94th Engineer Battalion, 4th Maneuver Enhancement Brigade	Fort Leonard Wood, Missouri
Turner, Private First Class Ricky L.	3d Brigade Special Troops Battalion, 3d Brigade Combat Team	Fort Bragg, North Carolina

Geospatial Engineering: Combat Development Update

By Mr. Kenneth Bergman

This article provides an update on emerging changes in geospatial engineering and battle command that better enable current and future warfighters in situational understanding and decisionmaking. To this end, the United States Army Training and Doctrine Command (TRADOC) Capability Manager–Geospatial (TCM–Geospatial) completed the Army Geospatial Enterprise functional solutions analysis (FSA) in August 2007. Since then, the TCM–Geospatial and the United States Army Maneuver Support Center (MANSCEN), Fort Leonard Wood, Missouri, have been working with the Army Staff and the United States Army Geospatial Center (AGC) (formerly the Topographic Engineering Center) to implement recommended solutions.

The geospatial enterprise FSA addresses a number of initiatives, one of which deals with organizational changes at the Department of the Army (DA) level to achieve governance across the Army. While the Chief of Engineers continues to serve as the Topographer of the Army, the Director of the AGC has been designated as the Deputy Topographer of the Army and the Army's Geospatial Information Officer (GIO). Mr. Robert Burkhardt, as the AGC Director and GIO, reports directly to the Chief of Engineers on geospatial matters. Mr. Burkhardt has initiated policies to standardize the use of geospatial capabilities in battle command systems. The Geospatial Acquisition Support Directorate (GASD) is a new organization established under the AGC that works across programs of record to establish interoperable geospatial software tools and products based on common standards and interfaces. A new Geospatial Governance Board was established at DA to provide oversight and guidance at the general officer level.

To support these top-level changes, the geospatial engineers are working at all echelons to establish a new concept called the Army Geospatial Enterprise (AGE),[1] where all Soldiers in the field can use various geospatial products and discover and enter geospatial data in an enterprise (distributed) environment. The AGE concept embodies the Army tenet that "every Soldier is a sensor." Soldiers on the ground provide the most accurate input on conditions that update the map foundation for the common operating picture (COP). Geospatial engineer teams will increasingly serve as clearinghouses for data flowing from convoys or patrols, helicopter pilots returning from missions, Soldiers with handheld devices, and other field sources.

The AGE is technically feasible in commercial software, but it has not yet been implemented across systems in the field. Geospatial data handling and management in battle command is currently a disjointed collection of processes and products resulting in multiple pictures with no unified COP.[2] This can be overcome by integrating standardized geographic information system (GIS) technologies across the Army's battle command systems. A GIS uses digital automated tools to manage, edit, and enhance geospatial information to support decisionmaking processes. A GIS can be used to represent the foundational geospatial layers depicted in Figure 1, page 47. Situational awareness information is depicted in the top layer of the figure, in conjunction with the geospatial foundation.

There is increasing recognition of the need for current, accurate GIS capabilities that form the foundation of the COP. This need is being met by organizational and technological changes that will accelerate the insertion of integrated solutions across all Army functional areas. These changes will ensure that our Soldiers receive enhanced geospatial capabilities in their battle command systems.

Under the GIO's direction, the GASD is leading efforts to standardize formats and types of geospatial products that are used in battle command systems. GIS standardization includes the establishment of an Army Geospatial Data Model. The GASD has already established an initial version of a geospatial data model that closely aligns with the National Geospatial–Intelligence Agency (NGA), as well as geospatial standards used by international and commercial communities. Modeling and simulation concepts are also being integrated into the Army Geospatial Data Model. Ongoing model development will lead to a common and interchangeable COP foundation that is built on data models and standards compatible within the Department of Defense (DOD) and with coalition partners.

GASD continues to promote the use of Commercial Joint Mapping Toolkit, where appropriate, across battle command and acquisition community programs of record. NGA oversees the development of the toolkit, including terrain-reasoning software that the AGC has developed. Warfighters have used sand tables for decades to analyze terrain and convey knowledge to others. Today's systems go several steps further by using tools that automate the modified combined obstacle overlay (MCOO). Emerging capabilities from the Battlespace Terrain Reasoning and Awareness program, led by the AGC, will enable Soldiers to use dynamic MCOO-related applications embedded in battle command systems to provide

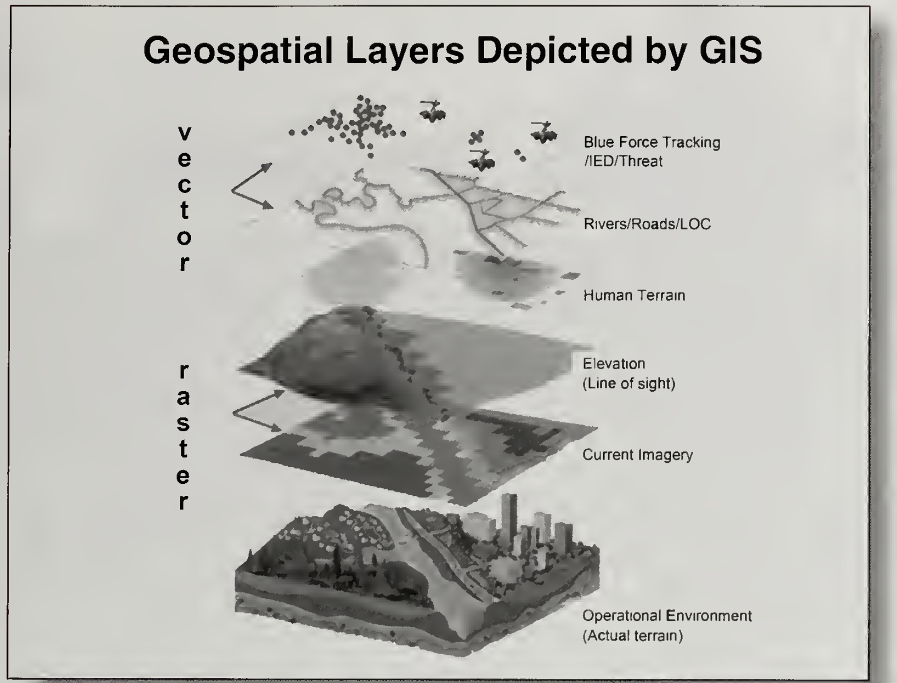

Geospatial Layers Depicted by GIS
vector
raster
Blue Force Tracking /IED/Threat
Rivers/Roads/LOC
Human Terrain
Elevation (Line of sight)
Current Imagery
Operational Environment (Actual terrain)

Figure 1

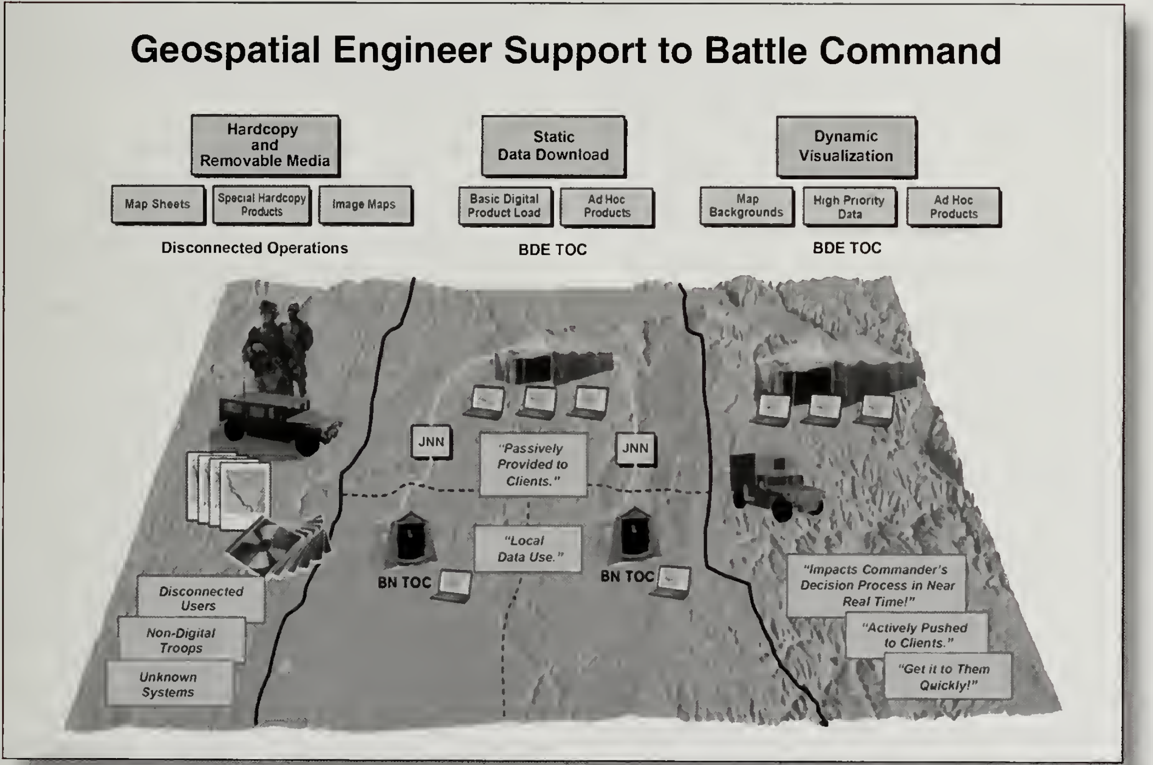

Geospatial Engineer Support to Battle Command
Hardcopy and Removable Media
Static Data Download
Dynamic Visualization
Map Sheets
Special Hardcopy Products
Image Maps
Basic Digital Product Load
Ad Hoc Products
Map Backgrounds
High Priority Data
Ad Hoc Products
Disconnected Operations
BDE TOC
BDE TOC
JNN
"Passively Provided to Clients."
JNN
"Local Data Use."
BN TOC
BN TOC
Disconnected Users
Non-Digital Troops
Unknown Systems
"Impacts Commander's Decision Process in Near Real Time!"
"Actively Pushed to Clients."
"Get it to Them Quickly!"

Figure 2

route analysis, line-of-sight analysis, and many other tools. Soldiers at the last tactical mile will be able to tap into terrain-reasoning capabilities at the platform level.

While all of these changes are taking place in battle command system development, the systems used by the geospatial engineer teams are changing as well. Geospatial engineers have used the Digital Topographic Support System (DTSS) for many years to support the military decisionmaking process. DTSS is migrating as the geospatial component of the Distributed Common Ground Station–Army to support integrated intelligence, surveillance, and reconnaissance capabilities. Figure 2 shows the various ways the geospatial engineer teams support battle command.[3]

Knowledge and understanding of geospatial capabilities are essential to providing our forces with the information advantages they need, especially in complex and urban terrain.

(Continued on page 49)

THE 3 Cs OF LEADERSHIP

By Major Brian S. Smith

In the military today, especially the Army, there is no skill more desirable for success than good leadership. The price paid for bad leadership or lack of leadership, tragically, is the ultimate sacrifice of Soldiers' lives. Good leaders do not magically appear; they are developed, or "grown from within." According to doctrine, "An Army leader is anyone who by virtue of assumed role or assigned responsibility inspires and influences people to accomplish organizational goals. Army leaders motivate people both inside and outside the chain of command to pursue actions, focus thinking, and shape decisions for the greater good of the organization."[1]

Leadership Attributes

The characteristics I look for in good leaders are the *3 Cs*: competence, confidence, and compassion. I learned these three attributes from former supervisors and noncommissioned officers (NCOs) in different forms and manners, but they all conveyed the same message. I viewed these attributes as necessary not only for good leaders but for followers as well, and adherence to them has contributed to many successes in my career on different levels.

Competence

First and foremost, good leaders need to be competent in their field. One does not need to know everything about one's field but must have breadth in knowledge and experience to receive a mission, analyze it, ask for guidance, recommend courses of actions, delegate tasks, and supervise as needed. All this is done with some level of assistance from one's peers, subordinates, and/or supervisors. For example, competent Army engineers must know the following: combat engineering (demolitions, mines, force protection, field craft, and explosives); combat construction (road, structure, or facility construction); military pipeline operations (storage and transport systems); facilities development and management (utilities and structures); power generation (military and civilian systems); dive operations (reconnaissance, salvage and recovery, destruction and demolitions, and construction operations); military bridging (tactical and nontactical); topographic and geospatial operations; and United States Army Corps of Engineers operations (military and civilian projects/activities).

Engineer officers will be not be expert in all of these areas, but they should have a general knowledge of these systems, how they work and support others, and whom to resource or leverage to get desired information and complete an assigned mission or task. When engineers join a unit, leaders and peers assume that they are technically adept and ready to advise or recommend engineer courses of actions. Many engineer officers have technical backgrounds while others just have technical training, whether professional or personal. Good engineer officers continue to develop professionally (and train) and seek mentorship to ensure that they are true combat multipliers. Leadership is not only on the battlefield or in direct conflict but also off the battlefield, such as Lieutenant General Russel L. Honore's actions and command during Hurricane Katrina, or General David H. Petraeus' expressed importance of transition teams to assist in our nation's efforts in Iraq and Afghanistan.

Confidence

Second, leaders must be confident in action and in word. This contagious confidence influences an ideology in which orders are delegated, not questioned, and followed specifically to include whatever guidance is given. One's subordinates or peers will be encouraged to "buy in" to that guidance and exhibit their own initiative when confidence is modeled by a leader. Confidence is a physical aspect illustrated by direct presentation: how one dresses, speaks, or interacts with others, professionally and personally. Good leaders know the difference between confidence and overconfidence (cockiness) and where to the draw the line; each of these two levels of confidence has a place in leadership.

Compassion

Finally, leaders must have compassion and respect for co-workers—and especially subordinates. At times, compassion requires leaders to have physical, mental, and spiritual courage. Such courage is what inspires others willingly to go the extra mile, to give 110 percent or, if necessary, to lay down their lives for a buddy. Good leaders should praise and reward members of the organization as well as counsel and punish; with punishment, good leaders look at all matters of mitigation and decide an outcome (and live with it). Leaders must recognize the dynamics of the organization and team-build to bring others on to their philosophy. The downside to compassion is that at times it can be abused; additionally, some people view compassion as a character weakness. If leaders are compassionate as well as competent and confident, compassion will be seen as strength.

Summary

Our Soldiers, their Families, and our leaders deserve our competence, confidence, and compassion. It is these ideals which inspire that private, that NCO, or that lieutenant to get up day after day in combat and say, "Let's go!" When Family members see those qualities in good leaders, they will have faith that their loved ones are in good hands and confidence that they will return home safely. Leadership is the number one business of all Army officers, next to management of resources and personnel, and leaders should strive to be impact players or combat multipliers wherever the assignment is to do their country's bidding. Leaders at all levels should continue to "fill their lamps with oil" to further develop leadership and critical thinking skills. No matter where our boots take us, we owe it to our subordinates to be competent, confident, and compassionate!

Major Smith is attending the Intermediate Level Education Course at the Command and General Staff College, Fort Leavenworth, Kansas. Previously, he was the Assistant Brigade Operations Officer in the 189th Infantry Brigade, Fort Bragg, North Carolina, and served as commander of a mechanized engineer company in the 2d Engineer Battalion and also a Bradley Fighting Vehicle Company in the 2-9 Infantry Regiment, 2d Infantry Division, South Korea. He is a graduate of the Engineer Captains Career Course and holds a bachelor's in mechanical engineering from the United States Military Academy, a master's in engineering management from the University of Missouri-Rolla (now Missouri University of Science and Technology), and is pursuing a master's in business administration at Benedictine College in Atchison, Kansas.

Endnote

[1] Field Manual 6-22, *Army Leadership*, 12 October 2006, paragraph 1-2.

("Geospatial Engineering," continued from page 47)

After eight years of engagement in the War on Terrorism, we currently have unprecedented levels of detailed geospatial data, but many Soldiers are simply unaware of these capabilities. As we continue to advance the geospatial capabilities used in battle command, it is essential that Soldiers receive the training they need to understand the operational environment. Training all Army leaders is critical in properly equipping our Soldiers for deployments. MANSCEN is conducting a training needs assessment to produce an overall training strategy to adjust professional military education so all Soldiers can better leverage geospatial capabilities. Decisions regarding geospatial engineering combat development will continue to have a significant impact on the Army, DOD, and coalition partners. These geospatial initiatives are changing the way we operate in the Engineer Regiment and across all Army functional areas. As we advance the state of the art in geospatial engineering, we maximize the informational advantage for all warfighters in successful mission execution.

Mr. Bergman is a member of the Corps of Engineers Army Geospatial Center (AGC). He is assigned to Fort Leonard Wood, Missouri, to provide direct support to TCM–Geospatial. A former United States Marine, he is a Naval Academy graduate and holds a master's in systems engineering from George Mason University.

Endnotes

[1] The Army Geospatial Enterprise (AGE) comprises the people, organizations, and technology involved in acquiring and managing geospatial data that affects all Army missions. Army battle command, consisting of operations, intelligence, mission rehearsal, and training capabilities, all depend on achieving an AGE. At its core, the AGE is a distributed database and supporting infrastructure that is based on a common suite of interoperable software. The AGE allows geospatial data to be collected, stored, fused, analyzed, and disseminated horizontally and vertically (from peer-to-peer and from echelon to echelon, down to the individual Soldier.

[2] Major David P. Burris, "White Paper on Geospatial Support to Battle Command," TCM–Geospatial, Maneuver Support Center, Fort Leonard Wood, Missouri, 9 January 2008.

[3] Figure from <*http://www.tec.army.mil/ctis/software/geospatial_services/index.html*>.

Appearing Larger Than We Are:

The Story of the 1st Brigade Special Troops Battalion, 1st Brigade Combat Team, 82d Airborne Division

By Lieutenant Colonel Frederic A. Drummond and Major James H. Schreiner

During Operation Iraqi Freedom (from June 2007 through July 2008), the 1st Brigade Special Troops Battalion (BSTB), 1st Brigade Combat Team (BCT), 82d Airborne Division, deployed to Contingency Operating Base Adder in Dhi Qar Province of southern Iraq. Initially charged with the theater security and security forces mission for Dhi Qar, al Muthanna, and Diwaniyah Provinces, the battalion conducted a successful in-stride transition to an operational overwatch mission in the provincial Iraqi-controlled province of al Muthanna and assistance in Dhi Qar. The 1st BSTB was charged with a mission set that tested the limits of the organization. The counterinsurgency (COIN) fight in the Shia-dominated, Iranian-influenced south presented difficult and unique challenges, and it led to a comment about "appearing larger than you are" by General David Petraeus, Multinational Force–Iraq (MNF–I) commander, on a visit to one combat outpost. This is exactly what the battalion was tasked to achieve and exactly what it accomplished. The 1st BSTB was the right unit, with the right capabilities, at the right time to fight counterinsurgent and criminal elements in a nontraditional BSTB role. Through the use of a dynamic task-organization leveraging additional BCT assets, a well-defined campaign design with a stringent targeting system to adjust it, detailed interagency coordination enabling, and creative small-unit leadership, the BSTB's capabilities are well suited for COIN operations.

Traditional BSTB Tasks

Before describing how the 1st BSTB achieved success, it is important to understand more traditional BSTB tasks and current tactics, techniques, and procedures that have evolved during the War on Terrorism.The doctrinal mission statement of the BSTB highlights rear area security as one of the main tasks the organization was designed to accomplish. This responsibility is where the BSTB is more limited in nature due to the lack of depth in the organization. Traditionally, the BSTB has been employed to provide intelligence and signal enablers for the BCT, limited civil-military operations (CMO) command and control (C2) oversight, military training teams, route clearance operations, some base defense operations (with significant augmentation), detainee operations, and BCT C2 support and security with the headquarters/BCT company. Many of these tasks are stovepiped toward addressing specific BCT-level requirements that a BCT commander may not have the organizational energy to focus on specifically and are rarely used in close coordination with each other.

> *"Through the use of a dynamic task-organization leveraging additional BCT assets ... the BSTB's capabilities are well suited for COIN operations."*

Often, BSTBs are used as force provider units to augment BCT operations or other task force-sized elements handling very specific tasks. Rarely is a BSTB headquarters charged with planning, synchronizing, resourcing, and executing multiple items from the BCT mission-essential task list (METL) in a BCT's area of operations. The 1st BSTB validated the idea that the fusion of its unique capabilities into small units under a company C2 system—with the battalion providing the framework for that unity of effort—is ideal for the mission. This unique fusion provided a new way to "appear larger than we are" with some BCT enablers helping to build capabilities that lacked depth. The combination of such capabilities validates the theory described in the July-September 2006 issue of *Engineer* by then Lieutenant Colonel Thomas H. Magness, then an Army War College Fellow at the University of Texas, that 1+1+1>3 in a complex COIN fight.[1] With the right balance and clear vision, the BSTB has ideal capabilities and diverse military skills to apply to COIN operations in a BCT mission set.

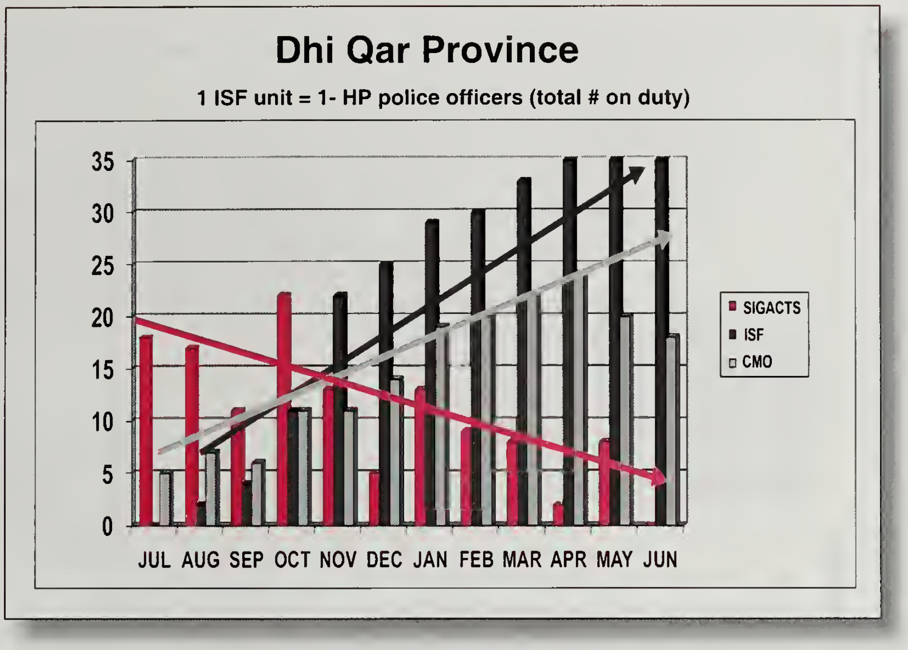


Figure 1. Trend Lines of Enemy Activity (EFP/IDF/Complex Attacks) on Coalition versus CMO Engagements/Partnerships and Capable ISF Application

The support behind the argument is generally found within the statistics over the 1st BSTB's 14-month combat tour. Three primary mission-essential tasks were assigned to the battalion:

- Secure freedom of movement along Main Supply Route (MSR) Tampa
- Provide operational overwatch to al Muthanna Province
- Conduct CMO for the BCT

The results for the 1st BSTB's combat actions from June 2007 through July 2008 argue that, while not a completely causal relationship, the skill sets of a BSTB can be very effective within a sound COIN strategy. The downturn in enemy operations (see Figure 1) was a result of all the teams operating in southern Iraq—to include other defense agencies, civil affairs teams, provincial reconstruction teams (PRTs), and other government agencies (OGAs)—but the battalion was a key enabler and catalyst for significant atmospheric changes in the tribal areas that had been previously untouched by coalition forces. This persistent engagement with the locals and assistance from provisional government officials aided in the tremendous success achieved by all forces listed above.

Dynamic Task Organization

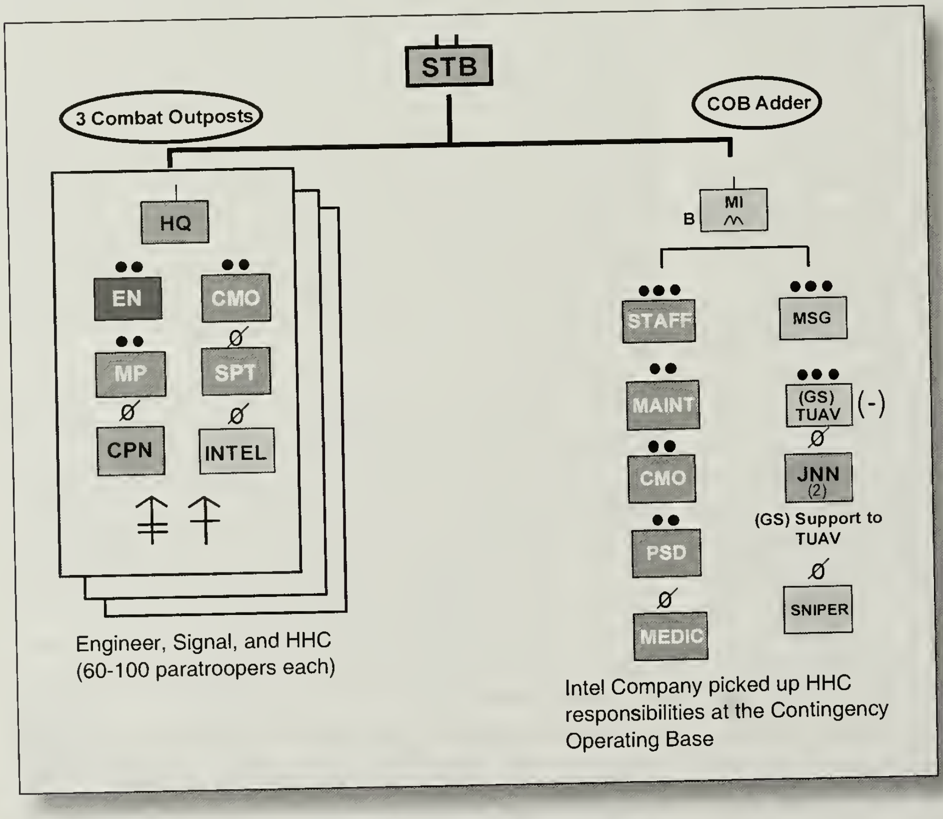
On arrival in June 2007, the BSTB was assigned to secure five radio relay points along MSR Tampa and to disrupt improvised explosive device (IED) cells along the MSRs. An offensive mind-set, and some creative repositioning of critical enablers from the brigade and battalion, turned these five relay points into three legacy combat outposts (COPs) through the use of improved communications systems; mortar teams; and human intelligence (HUMINT) collection, signal, and intelligence capabilities. The remaining COPs were task-organized with a similar capability due to threats, but could easily be modified to address surges in explosively formed projectiles (EFP) activity, PRT efforts, and basic engagement needs as the mission set was modified. At COP 4 in Diwaniyah Province and COP 9 in Dhi Qar Province, the threat was almost exclusively from EFPs, complex attacks, and indirect fires (IDFs). At COP 6 in al Muthanna Province, the threat was mostly from criminals acting against Iraqi commerce, using MSR Tampa as the most expedient route from Basra to Baghdad. The task organization in Figure 2, page 52, became the essential team that staffed the COPs throughout the 14-month rotation. Guidance from the MNF–I commander was to "live among the people. You cannot commute to this fight. Position … combat outposts … in the neighborhoods we intend to secure. Living among the people is essential to securing them and defeating the insurgents."[2] The 1st BSTB provided a solid mix of capabilities when augmented by a few additional BCT assets and epitomized the General Petraeus strategy of forward engagement.

Fundamental to the success of each COP was the diverse mixture of military occupational specialties and multiple branch-specific officers. The COPs, with fewer than 100 Soldiers each, could deal with installation defense, installation support, route security, CMO, and security force partnerships. Deliberate route clearance along 250 kilometers of road led to the reduction of Tier 1 IED hot spots from eight in June 2007 to zero in March 2008. This allowed a distinct move to hold-and-build operations along that same stretch of road while maintaining flexibility for the commander to surge security forces back.

Combat engineers and military police focused efforts on security and partnership with Iraqi army, police special units, and Iraqi Highway Police (IHP), while CMO patrols engaged the populations, enabling PRTs and other agencies to build capacity and infrastructure. Together, these efforts created space, or freedom of movement, for all engagements. HUMINT collection team (HCT) operations from COPs 4 and 9 would be integrated into all security and CMO patrols, thus filling information voids in the three provinces. That in turn led to increased freedom of movement and multiple target packages to be handed off to maneuver forces. The diverse set of capabilities brought to bear set conditions for an ever-increasing sphere of influence for the BCT in the three provinces. In essence, it set conditions for the transition from telecommunications and theater security to an effective operational overwatch mission and created space for the BCT to expand its reach and support Iraqi army operations in Basra and Amarrah with great success during April and May 2008.

Campaign Design and Targeting

The dynamic task organization is only good if all the unit efforts are working toward one common goal. Understanding the dynamics of the COIN fight, and the propensity for battalion milestones to change in achieving that goal, forced an extremely defined, yet adaptive, process to be created. Field Manual (FM) 3-24, *Counterinsurgency Operations*, has dedicated a complete chapter to the development of rigid processes that increase unit flexibility. "The campaign design must therefore guide and empower subordinate leaders to conduct the coordination, cooperation, and innovation required to achieve the campaign purpose in a manner best suited to local conditions."[3] In operations across three provinces, fighting three distinct sets of enemy influence and actions, the need for relevant systems was instrumental to any success the battalion would have.



Engineer, Signal, and HHC (60-100 paratroopers each)

Intel Company picked up HHC responsibilities at the Contingency Operating Base

Figure 2. Task Organization

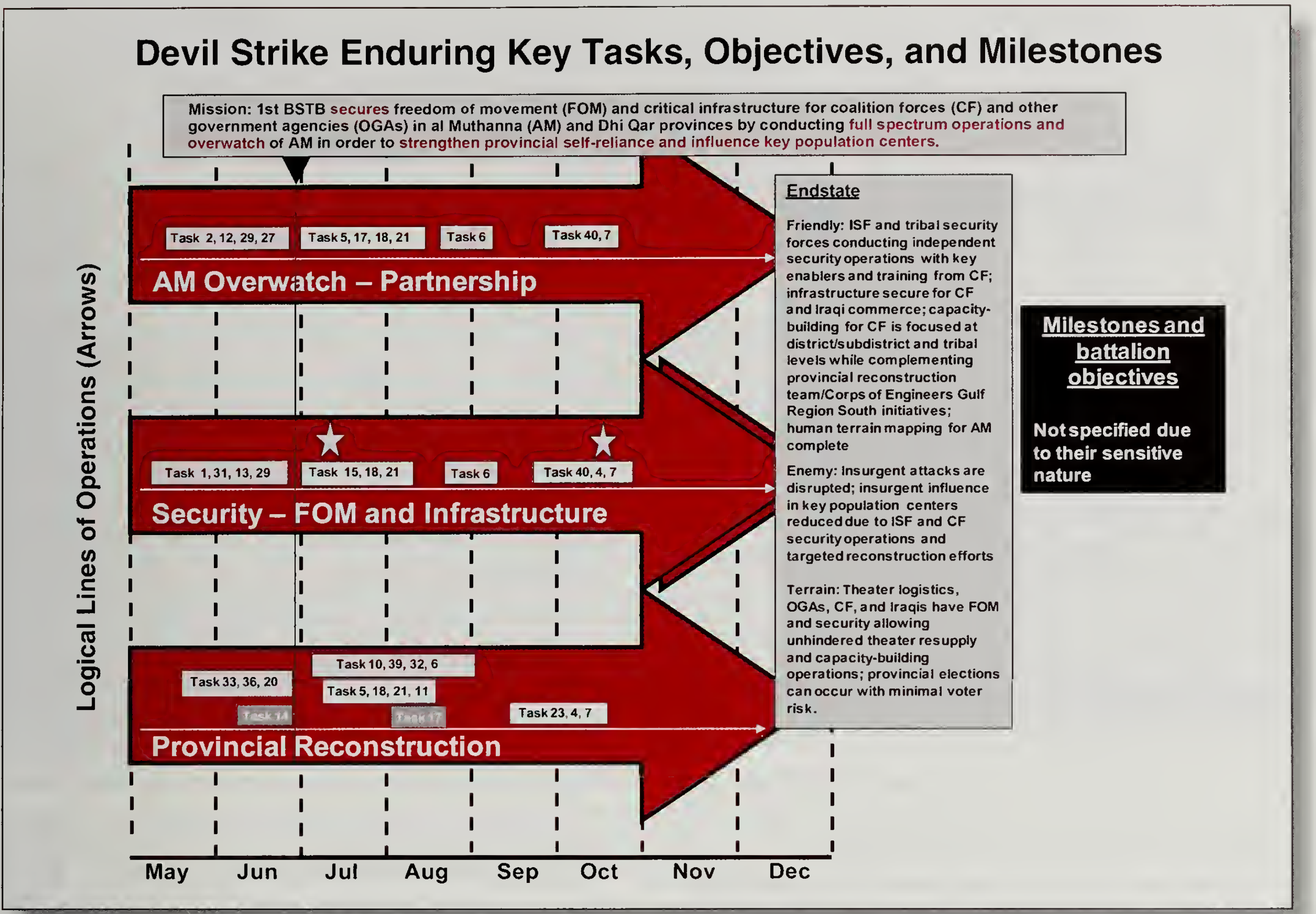
The operational design enabled the battalion to keep its focus clearly within a security logical line of operations (LLO) with focus on the COPs and freedom of movement along the main and alternate supply routes. Flanking efforts included the operational overwatch of the al Muthanna Province and a separate LLO for the engagements with three separate PRTs. This road map for the battalion was nested within the BCT targeting cycle and allowed the battalion to adopt a one-week targeting and synchronization cycle that was adaptive and responsive enough to stay even with, or ahead of, the daily change in atmospherics. Reactions to EFP Tier 1 sight evolution; security and reconstruction changes in dynamics; a changing political landscape at provincial, tribal, and district levels; and the BCT focus on operational-level and some strategic-level planning was possible through this system. A simple fragmentary order (FRAGO) with a synchronization and execution matrix enabled resourcing to support operations along the 250-kilometer stretch of MSR. This FRAGO also included the overwatch portion of the battalion's mission.

The culmination of the process included a weekly briefing to the battalion commander that included the following:

- Intelligence summary with more detail than the normal battalion operations and intelligence briefings
- Battalion milestone review with measure-of-effectiveness trends from the previous week
- Breakdown of the high-payoff target list with actionable efforts toward achieving those milestones

New milestones were nominated in this meeting, and the high-payoff targets would be rendered active or passive for the upcoming week. Battalion planning priorities of work would be locked in by the commander and focus the staff for two weeks out. The end-state was an order that provided course corrections to the campaign plan and added maximum flexibility for the COP commanders to engage in security, partnership with Iraqi Security Forces (ISF), and reconstruction efforts. The systems allowed the commander to exercise effective battle command. In particular, the battalion could see the enemy and adapt quickly to understand the dynamics governing the environment.

"Understanding tribal loyalties, political motivations, and family relationships is essential to defeating the enemy we faced, a task more


Devil Strike Enduring Key Tasks, Objectives, and Milestones

Mission: 1st BSTB secures freedom of movement (FOM) and critical infrastructure for coalition forces (CF) and other government agencies (OGAs) in al Muthanna (AM) and Dhi Qar provinces by conducting full spectrum operations and overwatch of AM in order to strengthen provincial self-reliance and influence key population centers.

Endstate

Friendly: ISF and tribal security forces conducting independent security operations with key enablers and training from CF; infrastructure secure for CF and Iraqi commerce; capacity-building for CF is focused at district/subdistrict and tribal levels while complementing provincial reconstruction team/Corps of Engineers Gulf Region South initiatives; human terrain mapping for AM complete

Enemy: Insurgent attacks are disrupted; insurgent influence in key population centers reduced due to ISF and CF security operations and targeted reconstruction efforts

Terrain: Theater logistics, OGAs, CF, and Iraqis have FOM and security allowing unhindered theater resupply and capacity-building operations; provincial elections can occur with minimal voter risk.

Milestones and battalion objectives

Not specified due to their sensitive nature

Figure 3. Battalion Milestones and Logical Lines of Operations

akin to breaking up a Mafia crime ring than dismantling a conventional enemy battalion or brigade."[4] The system created an environment within the battalion that allowed the creation of a "human terrain map," helping to feed the targeting process and answer battalion and brigade commanders' critical intelligence requirements. The process enabled the COIN fight focus, and the unique characteristics of the BSTB created the capability to address a wide array of challenges, with these systems providing the rudder for all operations.

In total, the battalion staff required external assets to implement this system, much like the COPs needed augmentation in mortar crew and HCT operators. The need for a full-time fire support/targeting officer, a signal officer, and a CMO officer were just three fills that were external tasking, but critical to mission accomplishment. Systems in a BSTB can make the battalion a large force multiplier to the BCT, but key augmentations must be addressed from a modified table of organization and equipment (MTOE) change initiative. Further review of these critical capabilities must accompany unit status reporting and drive the study of MTOE revision for the unit to be a more independent and self-sufficient enabler in both lethal and nonlethal operations in support of a BCT.

While there are some areas where help is needed, the diverse BSTB staff capabilities create an extremely positive learning atmosphere. For example, within the operations and training section alone, an engineer officer in charge led a team of two infantry captains, two military intelligence captains, a logistics captain, and a fire support officer. Making all orders and targeting operational for four different types of companies with 67 different military occupational specialties with different METL sets of core competencies was extremely complex. Leaders in a BSTB must learn each other's skill sets so that the companies can be properly planned for, resourced, and led in training and operations. The rigid campaign design and targeting process provide the framework to ensure that a common language is understood and that the diverse nature of the organization can be overcome when working outside of the core mission sets.

Interagency Engagement and Engaged Leadership

The systems in place in the 1st BSTB enabled quick recognition that a plan was on or off course. Commanders at the battalion and company levels—and their understanding of the nested commander's intent—allowed for maximum creativity in developing the "how" to achieve milestones (see Figure 3). Subsequently, the strong relationships with the Department of State (DOS) and other

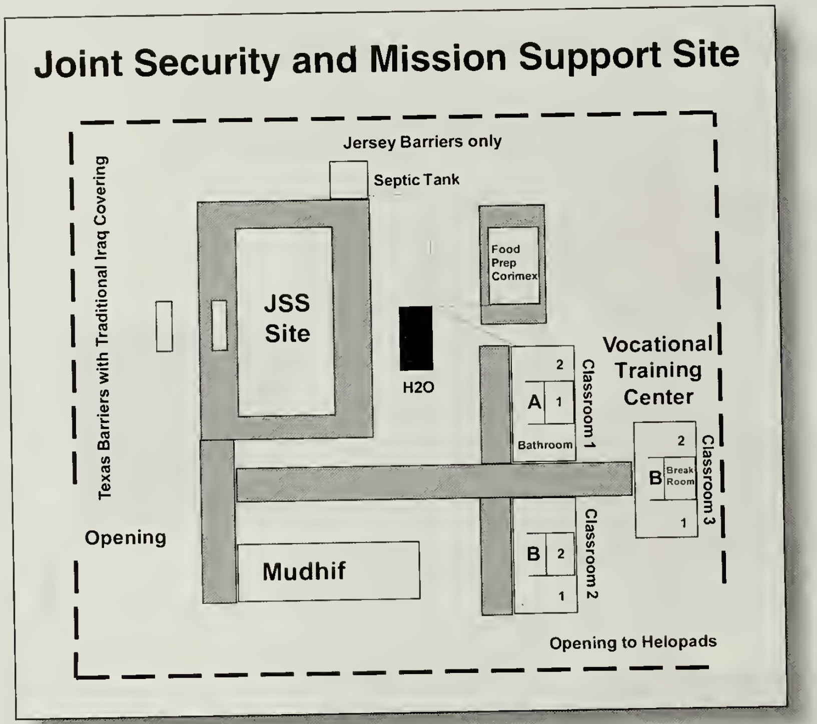


Figure 4. An Example of a JSS/MSS

governmental agencies allowed "spheres of influence" to expand rapidly. FM 3-24 has dedicated an entire chapter to leadership, which must be creative and accountable.

"Senior commanders are responsible for maintaining the 'moral high ground' in all deeds and words of their units."[5] The battalion leadership understood that while the COIN fight is extremely decentralized in nature, each commissioned and noncommissioned officer must be grounded in the commander's intent and prepared to enforce legal and ethical behavior while implementing creative solutions to win influence over the population or deny influence to the enemy. In many instances, this meant high densities of leadership with few Soldiers to conduct key leader engagements.

One prime example of battalion imagination was the creation of a joint security site (JSS)/mission support site (MSS) at COP 6 in al Muthanna Province (see Figure 4). This combined effort between the PRT, the Civil Police Authority Training Team, and coalition forces occurred from battalion through platoon levels. The 1st BSTB provided security for the C2 site, freedom of movement for the PRT throughout the province, and leverage with partners in the ISF and government to begin advanced training of special police and Iraqi army units from the site. It offered a JSS for intelligence sharing and partnership development between key players in the province, encompassing governance at the tribal and provincial levels, and security elements. This initiative was not a specified task, yet it became a beacon for other provinces, Iraqi government officials, and U.S. congressional staffers who became interested in studying because the site leveraged the capabilities of Department of Defense (DOD), DOS, and other agencies in appearing larger than we were. This one example was developed over time by the PRT team chief with the battalion and COP 6 commander and staff.

Another example of creative leadership emanated from the military police leaders at COP 6 and COP 9, who developed training plans with the IHP, the most under-resourced security forces in the ISF. Weekly classroom, range, and on-the-job training enabled the building of bonds between the units and helped deter more than 15 EFP detonations and traffic accidents.

Two examples of the BSTB's unique capabilities that would be missing in maneuver units were the engineer and CMO leaders closely working with the PRTs and military police Soldiers who were experts at traffic checkpoint operations. Given the COIN threats of small EFP and indirect-fire cells, and the limited-sized threat to the units, the BSTB brought the ideal capabilities to apply to the problem set. Couple this with an imagination that can expand and build new concepts in the interagency and multinational reality, and the unit can thrive. Many of the integration concepts for the JSS/MSS are now being studied in new DOS structures for teaching at combat training centers and in the Officer Educational System. An interagency team is currently working to develop such a structure and will become the hub for all PRT lessons learned at DOS and DOD training centers.

One area that will have to be closely developed is the DOS mind-set that an aggressive approach in engagement is needed at provincial, tribal, and district levels simultaneously. This is perhaps one area where a battalion can only cover so much ground due to lack of subject matter experts. The willingness to use those experts and reach out to the provinces plays a key part in the hold-and-build portions of a COIN fight. Even with a mixture of engineers, military police, and CMO personnel, a BSTB still is heavily reliant on DOS experts. Understanding COIN strategy is not a responsibility of DOD alone. Interagency engagement is only as good as the understanding of leaders in both organizations of COIN doctrine.

Summary

Despite many challenges, the 1st BSTB proved that it could be an extreme force multiplier in the COIN fight when left to fight as an organic battalion with key enablers from the BCT. In 14 months, it took roads most susceptible to EFP and complex attacks and reduced the frequency of attacks by as much as 90 percent in most areas and eradicated them completely in others. Augmented with a robust CMO and ISF partnership strategy, systems to keep the battalion leadership on course, and the inclusion of OGAs, the battalion enjoyed extreme success. One of the key themes of the battalion was to "extend a hand in partnership, but always remain vigilant of the threat." Learning to adapt to the

(Continued on page 64)

LESSONS LEARNED FROM THE FRONT—OPERATION ENDURING FREEDOM

By Lieutenant Colonel Ronald E. Zimmerman, Captain Caitlin M. Dempsey, and First Lieutenant Haley E. Whitfield

On 10 May 2008, the 62d Engineer Battalion (Combat) (Heavy) assumed responsibility from the 864th Engineer Battalion (Combat) (Heavy) at Forward Operating Base Sharana in Afghanistan. In preparation for this, our home station training at Fort Hood, Texas, focused on four priorities:

- Building roads, operating bases, and force protection in support of maneuver forces
- Developing strong leaders who inspire their Soldiers with the will and skill to win in combat
- Training Soldiers on basic combat and engineer-skill tasks
- Developing strong Family Readiness Groups (FRGs) and rear detachments

We capitalized on unique training opportunities to develop junior leaders at Fort Hood during our predeployment training. Our training built cohesive teams with Soldiers who shared a common bond, grounded in Warrior Skills. Finally, we built strong FRGs and rear detachments to take care of each other. Eight months into our deployment, our experiences continue to teach and challenge us. This article is an effort to share the experiences of our preparations for deployment and the personnel, logistical, and tactical challenges we have faced.

Warrior Skills as a Command Training Base

Key to our force protection success is engaged leadership and Warrior Skills training as a prerequisite to our home station mission-essential task list (METL) (construction) training. At Fort Hood, we used a battalion "gate strategy" as a control mechanism in developing trained and sustainable companies and platoons. We focused on ensuring that all Soldiers possessed the individual skills necessary to accomplish their combat portion of the mission, thus surviving in a combat environment. We focused on achieving superior skills with weapons and marksmanship, reflexive fire, first aid, communication, navigation, and physical training. We reinforced basics such as land navigation, map reading, combat vehicle identification, proper operation of assigned equipment, and the effects of personal and crew-served weapons. We aggressively trained on convoy procedures, escalation of force, and counter improvised explosive device (C-IED) drills. We used lessons from the battalion's last Operation Iraqi Freedom deployment, our Army's current doctrine, and keys tasks from the unit being relieved in place—to include training on composite risk management—to shape training management at all levels within our battalion.

We found that protection—force protection, safety, fratricide avoidance, and field discipline—of Soldiers and their equipment requires engaged leadership. "Checking the block" by having platoon and company leadership complete composite risk management website classes is not sufficient. Every activity, action, and engagement must be assessed for risk. Leaders must be on the ground looking for negative trends and ensuring that risk mitigation factors are properly implemented. Supervisors who assist in unloading a truck are no longer supervising and thus have opened up the task for a mishap. Our underlying principle for protection is engaged leadership and a steadfast enforcement of standards and discipline, regardless of the task or location.

Effects on Officer Development

Officer promotions come earlier than in the past. Second lieutenants are promoted to first lieutenant in 18 months and are then promoted to captain 16 to 20 months later. With time spent attending the basic officer leader course (BOLC), and many officers attending schools such as Airborne, Ranger, and Sapper after BOLC, second lieutenants may be in a unit for only 6 to 8 months before pinning on first lieutenant bars. At that point, young officers are getting ready to move to either a company executive officer position or a headquarters staff position. This means that many of today's officers have very little time to learn and grow as platoon leaders. Because growth comes from institutional knowledge and experience, many of our young officers lack the cumulative advantage and practical intelligence associated with years of experience. The growth of young officers requires practical learning engagements that come from 12 to 18 months as a platoon leader. If officers had additional platoon leader time before promotion to captain, they would learn more of the basics needed to build on throughout the rest of their careers. This also affects the ability of a commander to send a promotable first lieutenant to the career course. Often, that lieutenant may not have experienced various jobs within the battalion before moving on.

The opposite side of that argument is that young officers frequently complete their platoon leader time in combat. To use the "drinking from a fire hose" analogy, today's platoon leaders are learning more in a shorter amount of time because of current wartime situations. A young lieutenant learns more quickly by leading Soldiers in combat than by just training with them at home station, although sometimes the lesson is a shortcut rather than the standard. Thus, our model of officer growth should account for combat experience, maturity, and career desires. We should focus on quality of leadership and practical experience, versus time in a leadership position.[1]

Out-of-Cycle Deployments

Out-of-cycle deployments under the auspice of modularity are negatively affecting our flexibility in officer and noncommissioned officer (NCO) development. The battalion has five companies deployed to Afghanistan and one to Iraq. However, there are only three companies the battalion commander has flexibility in moving officers and NCOs through. Transfers within the battalion are impossible with the company in Iraq. One of the companies deployed to Afghanistan three months ahead of the rest of the battalion and has a home station at Fort Sill, Oklahoma, rather than Fort Hood. As a result, officers and NCOs can only be moved in or out of that company for short periods and must return to their original company for redeployment. Another company, although based at Fort Hood with the majority of the battalion, deployed two months ahead of the battalion. Its officers and NCOs also can be moved for only short amounts of time because they have to redeploy with their original company.

These restrictions limit the transfers the battalion commander can order within the battalion to move captains and promotable first lieutenants. More important, out-of-cycle deployments and modularity can inhibit officer growth in connection with early promotion cycles. Planners at the United States Army Forces Command (FORSCOM)-level must pay close attention to out-of-cycle deployments. Just because we can deploy engineer companies outside their parent battalion headquarters does not necessarily mean we should.

Demand for Sustainment Engineers in Stability Operations

Counterinsurgencies and stability operations like the current War on Terrorism are taxing on engineer units. In high-intensity conflicts, the infantry, armor, and other combat units bear much more of the brunt of responsibility. A combat heavy engineer battalion's role is inversely proportional to the intensity of the conflict. In counterinsurgency operations, engineers—and more specifically, construction engineers—bear a greater amount of responsibility. As the United States expands to remote areas of Afghanistan for security purposes and helps build infrastructure there, construction engineers are either doing the construction or executing quality assurance and quality control of local national construction. Construction engineers in most cases are either building new forward operating bases (FOBs) or expanding existing FOBs well before the arrival of maneuver forces. We have found that it takes nearly two-and-one-half months to build a battalion task force-level operating base. Before a maneuver unit sends a squad of Soldiers to a tiny outpost for weeks at a time, engineers are sent there to build up the observation post and make it as livable as possible for the maneuver Soldiers. Naturally, security is provided by maneuver forces. Engineers are in such high demand during stability operations that it makes it even more difficult for an engineer commander to release any veteran officers or NCOs.

The high demand for engineer units during this ever-changing counterinsurgency fight also results in more frequent deployment cycles for the engineers. During home station predeployment training, deploying unit commanders are reluctant to transition unit-level leadership as teams are forming. There is little time for retraining new team, platoon, company, or staff leadership. Commanders become even more unwilling to release officers and NCOs in exchange for untrained new additions to the battalion. However, if the officers and NCOs are going to continue their development, they need to move on to Army schools. Commanders must accept that they might not have a full year of training with a group of officers and NCOs and then deploy for 12 months with that same group of Soldiers. More important, the United States Army Human Resources Command (HRC) must fill units on a steady cycle versus once per year. Yearly dumps of second lieutenants straight out of the basic course, compared to a steady flow of replacements, lead to massive changes.

Standard Guard Tower Construction

Officer replacements and school slots must be aligned with redeployment of units. The increased need for engineers has created out-of-cycle deployments for engineer companies that negatively affect officer development.

Legacy Battalion in Dispersed Operations

Legacy combat heavy engineer battalions are not designed for dispersed operations. Until recently, the 62d Engineer Battalion was the only construction battalion in-theater during expansions in Regional Command–East (RC–E) and Regional Command–South (RC–S). The battalion is a legacy modified table of organization and equipment (MTOE) engineer battalion operating as a transformed modular unit dispersed across a wide area. Our staff is not nearly as robust as a transformed battalion staff. Controlling the expansion of multiple battalion- and brigade-level operating bases, while simultaneously controlling upgrades of existing operating bases, greatly stretched our doctrinal command and control (C2) capabilities. We now have four C2 nodes to support expansion and sustainment construction at—

- FOB Sharana, the battalion tactical operations center (TOC).
- Bagram Air Base, the battalion administration/logistics operations center.
- FOB Shank, where RC–E is being expanded to support the arrival of a brigade combat team (BCT).
- Kandahar, in support of RC–S/Task Force 2-2 Infantry expansion, which will soon move north to FOB Wolverine.

Each of these command nodes requires additional personnel and equipment above MTOE authorization. To maintain an aggressive maintenance posture, the battalion uses four different supply/support activity locations. Soldiers fly out of Kandahar and Bagram for rest and recuperation leave and redeployment because of our dispersion. Liaison officer teams are located at each Class IV construction material site to maintain visibility of inventories and the status of material being pushed from the Class IV yard to the construction site. The battalion purchased 20 satellite telephones and minutes for improved C2 and for Soldier morale, given the units' remote locations. In the end, our MTOE relevant to C2 does not fit the current dispersed construction fight. However, thanks to nontraditional methods, we maintain construction efforts in spite of the increasing construction requirements.

Class IV Management

Acquisition and battle-tracking of Class IV construction material and the lack of host nation trucking reliability are unique challenges within Afghanistan. Contractor-run Class IV yards control construction material. There are five supply yards in-country responsible for filling and shipping our construction material. While each Class IV yard performs the same function, they do not all provide requesting units the same information necessary to acquire and track a bill of material (BOM) in the most efficient manner possible. Class IV yards are responsible for loading and shipping material to each project site. However, they do not accurately keep track of the material they ship to each site, and each yard has a different standard for reporting what it has shipped. Members of the logistical community work hard at maintaining their Class IV yards. However, they do not understand construction well enough to realize how important Class IV management is to engineers or how management of construction material must be treated differently from other classes of supply.

As mitigation, we recently created liasion officer teams at Class IV yards to provide visibility on inventory and jobsite shipment amounts. However, 3- to 4-week project delays are common due to operational impacts and bad weather. There are no Army truck companies in-theater, which means that all construction materials travel by host nation trucks. Delayed delivery resulted in wasted time, material, and money. Education about project management and vulnerability identification of tactical risks remains paramount for officers, given the fluid construction environment. Company commanders identify project vulnerabilities, mitigation, and decision points (complete with priority intelligence requirements, friendly force information requirements, and essential elements of friendly information, given insurgent attacks associated with movement of Class IV materials and equipment).

Finally, engineers should simply take on and resource the task of Class IV management, similar to the standard in which we associate our actions with the BCT support battalion for Class IV/V supply points and mine dumps. Our plugs into the sustainment brigades would then be mission-essential tasks for battalion and brigade headquarters.

Standard Building Designs

Standard building designs have greatly increased efficiency in project management, construction, and acquisition of Class IV construction material. At the time of the battalion's arrival, different designs for similar buildings were used at each construction site. Three months into the deployment, a massive effort began to expand existing operating bases to receive additional maneuver forces repositioning to Afghanistan. Joint Facilities Utilization Board (JFUB) packets with incomplete designs were rapidly completed in order to jump-start the construction process. However, the lack of detailed plans resulted in project delays caused by inaccurate material ordering and frustrated movement of high-priority Class IV materials. To mitigate these issues, the battalion developed standard building designs for guard towers, semipermanent wooden "B-huts," Southeast Asia hut TOCs, helicopter landing zones (HLZs), and company-level contingency operating posts (COPs). Each design focused on available lumber versus off-the-shelf dimensional lumber. For example, the guard tower design called for 21-foot lengths of 8-inch by 8-inch lumber, but the best we could get in Afghanistan was 16-foot lengths. To gain the same load strength as 8-inch by 8-inch columns, we spliced and laminated five 16-foot lengths of 2-inch by 8-inch lumber, using designated nail and bolt patterns.

"Key to our force protection success is engaged leadership and Warrior Skills training as a prerequisite to our home station mission-essential task list (METL) (construction) training."

We implemented battalion standard designs based on subject matter expert and company-level experience. Building guard towers, B-huts, and TOCs were one company's strong point, while another company became known as our "cash cow" because of its ability to quickly build company-level COPs. Yet another company built most of the "hard huts," (B-huts with indirect-fire protection) in RC–E. Our horizontal assets built most of the HLZs and fuel farms, so their expertise became the battalion benchmark. Overall, standard designs increased our productivity in ordering BOMs and improved jobsite quality control and quality assurance. Standard designs greatly aided in construction rehearsal before beginning a project since squad leaders could determine their work effort and team taskings.

Moving a Combat Heavy Engineer Line Company

Traversing the battlefield provided many challenges to a combat heavy engineer line company that maneuver forces do not face. Frequently, mission dictates the movement of a single construction company, or even platoon, more than 300 kilometers with heavy engineer equipment. By MTOE, one engineer company consists of five M916 tractors with M870 trailers. A routine FOB construction mission typically requires 10-15 pieces of heavy engineer equipment, to include bulldozers, hydraulic excavators, bucket loaders, rollers, graders, and scrapers that weigh up to 76,000 pounds. Due to their limited number of organic transportation assets, engineer units are forced to rely on the support of host nation trucking, which could cause project delays, increased maneuver time between construction sites, and increased threat to Soldiers. To mitigate the obvious risks, units are forced to integrate the local national trucks into their convoys to ensure the security and timely arrival of their equipment and materials. If a request were submitted for ten 40-foot, flatbed local national trucks, only six would show up on the specified date with adequate specifications. Many local nationals overestimate the quality of their personally owned trucks. It is not uncommon to destroy the axle of a local national truck or turn a truck on its side during the process of loading a scraper or bulldozer in preparation for movement to the next construction site. The local national trucks are not equipped to support the weight of up-armored engineer equipment.

Adding local national trucks to a ground assault convoy greatly reduces the average speed and greatly increases the probability that the convoy will need assistance. Whether it is a flat tire, inadequate fluids, engine failure, or the mere inability to transport the assigned load, the host construction-maneuvering unit is forced to assist or recover the deadlined local national truck. This can force a convoy to stop in the middle of hostile terrain to provide support to the local national to ensure the safe arrival of the unit's equipment. Forcing a combat heavy engineer unit to stop and dismount adds a significant level of threat to an already dangerous mission of traveling across the battlefield. Heavy construction engineer units are not equipped to precisely maneuver, effectively engage, and actively pursue the enemy, characteristics that are commonly found in light maneuver units. Uncoiling a heavy construction engineer unit takes a great deal of time and precision that higher-echelon command units may not take into account during their planning process.

Conclusion

Maintaining focus on the mission is essential, regardless of the time remaining in our deployment. Our challenge is not to lose focus or become complacent in enforcing standards and discipline. Each construction task is another opportunity to increase work efficiency, sustain our Warrior Spirit, and maintain our position as builders of choice. Communication remains paramount as we continue to find every opportunity to mentor and develop the battalion's Soldiers and leaders. Moreover, given the battalion's dispersed environment and limited communication, each command visit is a detailed leader engagement that targets young leaders. We must communicate that deployment relief is in sight. More important, we must communicate that senior Army leadership is addressing improvements in schooling, assignments, and dwell time. Our Soldiers and leaders deserve honest dialogue on how no other organization in the world could sustain what our Army has completed over the last decade.

Lieutenant Colonel Zimmerman is Commander, 62d Engineer Battalion, now deployed to Afghanistan. Prior assignments include chief of plans for the 4th Infantry Division's initial assault into Iraq; operations officer for the 299th Engineer Battalion; operations officer for 1st Brigade Combat Team, 4th Infantry Division; and chief of plans for the 4th Infantry Division's second Operation Iraqi Freedom deployment. He holds a bachelor's in civil engineering–structures from the University of Wisconsin-Platteville, a master's in engineering management from the University of Missouri–Rolla (now Missouri University of Science and Technology), and a master's in airpower art and science from the School for Advanced Airpower Studies.

Captain Dempsey is the assistant operations officer and engineer Class IV manager with the 62d Engineer Battalion. Prior assignments include company executive officer and horizontal platoon leader. She holds a bachelor's in elementary education from Wake Forest University.

First Lieutenant Whitfield is the 62d Engineer Battalion assistant operations officer and battle captain. Previous assignments include vertical platoon leader and executive officer. She holds a bachelor's in engineering management from the United States Military Academy.

Endnote

[1] The retention of officers and NCOs is likely affected by the strain in the United States Army between mission accomplishment and officer development. The operational tempo in today's Army has caused a backlog of officers and NCOs in many units. Units are reluctant to release officers or NCOs because they have been trained for the upcoming deployments. Commanders, understandably, do not want to lose that training by releasing the veterans and deploying with new officers and NCOs. This is causing a long-range deterioration of both the officer corps and the NCO corps. Three factors are probable reasons that units do not release officers and NCOs in a timely manner that would benefit their careers. These factors, which are specifically focused on engineer units, are—

- Early promotion of young officers.
- Heavy use of engineers during counterinsurgency fights.
- Modularity or out-of-cycle deployment of engineer companies without their parent battalion headquarters.

I contend that we must understand from their viewpoint the challenges our junior leaders are experiencing within the United States Army. Accelerated timelines for officer promotions, high demand on engineer units for deployment purposes, and the structure of engineer units are, to some degree, causing friction with our young officers. We must communicate with our company-grade officers the same way we do with our young Soldiers. Senior leaders must understand the difference in generational perceptions between themselves and their junior officers and NCOs.

It is important for senior leaders to understand that our "Generation Y" leaders (those born after 1978) grew up in a climate of uncertainty, in which their adolescent years may have included the experience of parents divorcing and job loss. Members of Generation Y worry about their financial future, especially with today's market meltdown. As a result, they are less inclined to be loyal to—or feel a connection with—their work place. They expect instant gratification because they have faster access to information, thanks to technology. They prefer challenges to their abilities and thus career advancement. When we put into context the perceptions about Generation Y, such as the desire for instant gratification, preference for a casual environment (not to be confused with lack of professionalism), feeling of entitlement to job benefits they've not yet earned, and comfort with technology, we see four basic challenges from their viewpoint:

- Twelve- to fifteen-month deployments with minimal dwell time translates to minimal time with family when not deployed.
- Officers are stuck in the same unit too long when they deploy twice over the course of four to five years. (This may be a double-edged sword in that some young officers are probably interested in having multiple changes of station, as opposed to those with families, who probably wish for longer assignments to reduce the number of moves.)
- The Army system of formal training is not intellectually stimulating enough, considering their usual level of education.
- There is too much micromanagement, which does not empower company-grade leaders.

Taken in context, this list becomes a tool to gain a better understanding of the strain between mission accomplishment and officer development in order to reach a balance between operational deployments and officer retention. (California State University, Fullerton, "The Gen Y Perceptions Study," <*http:// www.spectrumknowledge.com/signatureprograms/index.html*>, 2008.)

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Jan 04	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** The estimated date for posting to Army Knowledge Online (AKO) is 3d Quarter FY09.
Organizational Manuals			
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations – Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** Published February 2009.
FM 3-34.23 (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations – Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15 and FM 5-116. **Status:** Comments closed on final draft; estimated publishing date is 4th Quarter FY09
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. **Status:** On hold for release of FM 3-90, *Tactics*
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sept 94 Mar 85	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE). **Status:** On hold for release of FM 3-90, *Tactics*.
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This manual provides survivability information needed by commanders and staff at the tactical level. It includes guidance on integrating survivability into planning and order production and creation of the engineer running estimate. It provides examples of a survivability capabilities card, matrix, and timeline to assist with the planning, revision, and conduct of specific survivability tasks. **Status:** On hold for release of FM 3-10, *Protection*.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
			General Engineering
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This manual describes the operational environment (OE) and how to apply and integrate general engineering principles in support of full spectrum operations. It focuses on the establishment and maintenance of lines of communications and engineer support to sustainment operations throughout the area of operation. Although not designated as a multi-Service publication, it is intended to inform all Service components of the types of general engineering tasks, planning considerations, variety of units available to perform them, and the capabilities of Army engineers to accomplish them. **Status:** Published December 2008.
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Navy plans to adopt it as well. **Status:** Adjudicating comments on the final draft.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. **Status:** Adjudicating comments on the final draft.
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This collaborative effort with the Navy includes the newest technologies and current practices. **Status:** Preparing the final draft for staffing to the force.
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy includes the newest technologies, current practices, and revised formulas. **Status:** The estimated date for posting to Army Knowledge Online (AKO) is 3d Quarter FY09.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	This manual gives directions on deploying and using engineer firefighting teams. These teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a theater of operations (TO). This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status:** Initiating the program directive and developing the initial draft.
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** The estimated date for posting to Army Knowledge Online (AKO) is 3d Quarter FY09.
Geospatial Engineering			
FM 3-34.600 (FM 3-34-230)	*Geospatial Operations*	3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of those engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Developing the final draft.

NOTE: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 10 February 2009.

("Clear the Way," continued from page 3)

> *A* ***Regimental Family*** *of the world's finest military engineers who* ***lead to serve others*** *and answer the call to* ***solve the commander's toughest problems****. A Regiment organized into* ***highly flexible, tailorable, and adaptive units*** *capable of supporting anyone, anywhere, with the right engineer capability. A Regiment filled with Soldiers* ***inspiring each other to go beyond*** *"Let Us Try" and achieve "Well done, engineer!"*

Is this vision of the Engineer Regiment and supporting key strategic tasks carved in stone? No, this is the mark I've personally set on the wall—my estimate of the way forward. I urge you to make your own assessment and come to ENFORCE prepared to be an active participant in the professional debate that will confirm this vision and chart our future. I only ask one thing…come prepared to take your historic experience and help shape the legacy we will pass on to our young engineers who will clear and build the way for our Army in the future.

CONTINUAL ASSESSMENT AND REVISION OF SOPS

By First Lieutenant Michael P. Carvelli

Current deployments to Operation Enduring Freedom and Operation Iraqi Freedom are forcing light, airborne, and mechanized units to operate as if they were motorized. The prevalence of high-mobility multipurpose wheeled vehicles (HMMWVs) and the new mine-resistant, ambush-protected (MRAP) vehicles have been the main facilitator of this change.

Platoon- and company-level leaders are the primary personnel responsible for recognizing and adapting to the continual changes occurring on the battlefield. Company commanders, platoon leaders, and platoon sergeants should be the driving force of continual assessment, rehearsal, training/ execution, and refinement of standing operating procedures (SOPs). Input from Soldiers filling all positions within a unit should be included as part of the continual assessment process. A patrol leader cannot fill all roles and relies on the information provided by gunners, drivers, dismounts, and others to improve all the areas included in the SOP.

After a deployment, the following areas of the SOP and unit training have undergone constant revision:

- Operations
- Maintenance/recovery
- Communications
- Medical needs
- Interpreters

Operations

Mission Briefs. Also known as "convoy briefs" or "patrol briefs," mission briefs should always be modeled after the five-paragraph operations order format. Signal plans, frequencies, priorities of medical support, and locations of key leaders typically do not change. Continual reviews of the SOPs are verbal precombat checks that the patrol leader gives during the brief. Add or delete what is relevant and applicable each time a mission brief is given.

Clearing Techniques. Integrate all host nation security forces to improve security and provide the direct link with locals. Always adjust to enemy tactics, techniques, and procedures (TTP). Consider the enemy's tactics, as they are always evolving, and adjust unit TTP accordingly.

Load Plans. These should be detailed enough to cover all mission-essential equipment, but not be so micromanaged that they detract from operator preference. Dictate where medical equipment, sensitive items, ammunition, and maintenance parts belong in each type of vehicle to ensure that Soldiers can quickly move to a vehicle and resupply as needed.

Maintenance/Recovery

Linkup. Develop SOPs and linkup procedures to integrate recovery assets or other units that assist with recovery. Define the roles of each element/leader—security, recovery, liaison—before the operation is conducted.

Equipment. Redundancy of recovery equipment such as tow straps, sling legs, and tow bars within the patrol are very necessary. For example, tow straps tend to break after just a single use. With the increase in weight and protection of vehicles, it is necessary to adapt recovery and operating equipment to achieve effective results in-sector. Spare recovery equipment is a must for all units.

Training. Practice recovery techniques across all vehicles within a patrol. Understanding the capabilities of recovery equipment can give leaders an increased ability to call for dedicated recovery assets while on a mission. This increases the unit's self-recovery ability and reduces the time that a unit is exposed with broken equipment.

Communications

Succession of Signal. Model communications after the primary, alternate, contingency, and emergency plan. Just like the succession of command, this gives each leader an immediate list when systems become unusable or unreliable.

Alternate Means. Each type of communication offers distinct advantages and disadvantages to the user. Leaders may be exposed to situations when one type of communication is ineffective and will need to immediately transfer to another type. Continual training and communication exercises are beneficial to units at all levels.

Medical Needs

Training. Preparing Soldiers for the need to provide lifesaving medical assistance will boost their confidence and improve their competence.

- *Monthly scenario-based training.* Complacency becomes more prevalent the longer a unit is deployed, and leaders must continue training to fight it. Keeping training both realistic and difficult ensures that each Soldier is prepared throughout the deployment.

- *Intravenous (IV) stick practice.* Practice giving IV injections under red light, while using night vision goggles, and while both patient and responder are wearing complete personal protective equipment. This will increase the lifesaving abilities of the Soldiers and give them confidence when injuries actually occur.
- *Limited visibility practice.* Perform all medical tasks under conditions of good and limited visibility to increase competence.

Combat Lifesavers (CLS). All personnel should be CLS-qualified. This is enforced very well within company-level units, but CLS certification should not end once the deployment begins. Plan and resource monthly or quarterly refreshers.

Standardization. The setup and location of all medical equipment should be standardized across a patrol. This includes the standardization of all individual first aid kits and CLS bags. The ability to quickly identify the location of medical equipment ensures effective and timely treatment.

Interpreters

Medical. Ensure that interpreters are CLS-qualified. Since interpreters are a combat multiplier, basic medical training will be extremely useful when needed.

Alternate Roles. Define the interpreter's role for each battle drill. For each drill, provide a task and purpose, such as "respond to a vehicle rollover" or "react to contact." The interpreter should have a designated place and activity that assists the unit with accountability during combat.

Quick Brief. Speak with the interpreter shortly before attending a meeting or speaking to a group of people to ensure that the interpreter understands your message clearly. This will clarify most of the speech. Also, the interpreter represents the speaker and should understand that voice inflection and emphasis are required across the language boundary.

Summary

Continual after-action reviews of missions and training will further refine any SOP that a unit uses. Input from gunners, drivers, truck commanders, medics, and others will enhance the efficiency and effectiveness of the unit and give each Soldier more motivation to speak in support of change. This ensures that all activities are streamlined and that each Soldier can improve the existing SOPs for future operations.

First Lieutenant Carvelli is the battalion engineer for the 3d Battalion, 75th Ranger Regiment. He has served as a task force engineer and sapper platoon leader with the 173d Special Troops Battalion. He holds a bachelor's in civil engineering technology from the Rochester Institute of Technology and has completed the Fundamentals of Engineering Exam in Pennsylvania.

("Appearing Larger," continued from page 54)

challenges and threats was a daily fight, but accomplished to a high standard. It is possible for a BSTB to operate successfully as a multifunctional battalion. It is about appearing larger than we are as a coalition and will continue to be as long as we are asked to fight and win the nation's wars.

Lieutenant Colonel Drummond is the Director of Operations, Task Force Bragg, XVIII Airborne Corps, Fort Bragg, North Carolina. Previous assignments include Commander, 1st Brigade Special Troops Battalion, 1st Brigade Combat Team, 82d Airborne Division; USCENTCOM ground operations officer and J3 executive officer; Combined Task Force 82 Senior Engineer, Operation Enduring Freedom; 307th Engineer Battalion executive and operations officer; and observer-controller (Scorpion and Sidewinder Teams) at the National Training Center, Fort Irwin, California. He holds a bachelor's in industrial management from the University of Nebraska–Kearney and a master's in business administration through Embry–Riddle University. He can be contacted at <frederic.drummond@us.army.mil>

Major Schreiner is an engineer officer serving as the 1st BSTB's executive officer. He was previously a battalion operations officer during Operation Iraqi Freedom. He served as a company commander in Operation Iraqi Freedom and as a strategic reconstruction officer to Combined Forces Command–Afghanistan Engineer Directorate in 2005. He holds a master's in engineering management from the University of Colorado and is a certified project management professional. He can be contacted at <james.schreiner@us.army.mil>.

Endnotes

[1] Lieutenant Colonel Thomas H. Magness, "Brigade Special Troops Battalions, Part I: All the Way In," *Engineer*, July-September 2006, p. 47.

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The Bridge at Remagen

By Captain Michael J. Halloran

"We were across the Rhine, on a permanent bridge; the traditional defensive barrier to the heart of Germany was pierced. The final defeat of the enemy, which we had long calculated would be accomplished in the spring and summer campaign of 1945, was suddenly, now, just around the corner."

—General Dwight D. Eisenhower

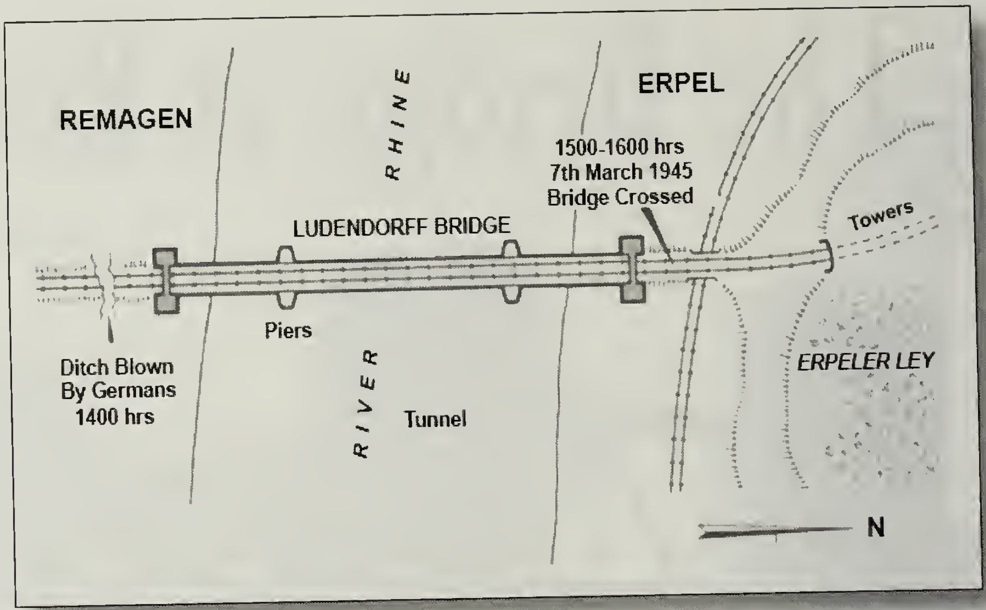
* * *

After successfully breaking through the defenses at the border of Germany early in 1945, the Allied forces had one obstacle—the Rhine River—denying them access to the heart of Nazi territory. At each Allied advance, the Germans destroyed the bridges spanning the river. The Ludendorff Bridge in Remagen was often overlooked due to its location 40 miles from the front lines. Thus, it was one of the few bridges still standing on 7 March 1945.

Remagen is located between Cologne and Koblenz. The Ludendorff Bridge stretched from the city of Remagen on the western bank to a 600-foot hill, known as the *Erpeler Ley*, on the eastern bank. The first American force to arrive at the bridge was a task force from the 9th Armored Division, commanded by Major General John W. Leonard. The task force consisted of the 14th Tank Battalion (minus Delta Company), the 27th Armored Infantry Battalion, and one platoon of C Troop, 85th Cavalry Reconnaissance Battalion.[1] Major Hans Scheller commanded the German forces defending Remagen and the Ludendorff Bridge. These forces included a bridge security company of 36 men led by Captain Willi Bratge, an engineer company of about 120 men led by Captain Karl Friesenhahn, 180 *Hitlerjugend*, an antiaircraft unit of 200 men, 20 men from a *Luftwaffe* rocket battery, 120 Eastern "volunteers," and roughly 500 civilian *Volksturm*. In all, the German forces amounted to roughly 1,000 men.[2]

Key Factors of the Battle

On 7 March 1945, Soldiers from the 9th Armored Division task force arrived at Remagen and captured the Ludendorff Bridge. The American forces won the battle by massing the effects of fire, rapidly conducting the operation, and taking the initiative. While the Germans did mass the effects of their flak guns and other available assets on the American tanks, they did not have enough firepower to overcome the American forces. Since the Germans did not integrate the effects of their fires with well-planned defensive positions, the Americans were able to reach the western banks of the Rhine River. This enabled the Americans to mass their own fires against the German units on the eastern bank. The Germans, fearing retaliation from superiors for failure to follow orders, took no initiative to improve their situation. However, had they emplaced explosives in different locations, the bridge may have collapsed. The American forces took the initiative from the start of the operation because intelligence had suggested that the bridge would be collapsed by the time they arrived at Remagen. The capture of the Ludendorff Bridge led to the passage of thousands of Allied forces into the center of Germany and aided in the ultimate defeat of Nazi Germany.



The daylong fight for the Ludendorff Bridge across the Rhine was intense. The bridge was weakened during the fighting and eventually collapsed. By then, a firm American bridgehead had already been established.

Minimal German Resistance

The first key factor in this battle—the minimal German resistance in Remagen—allowed a fast push by the American forces to the Ludendorff Bridge. The German failure was caused primarily by the lack of rear-allocated forces and reliance on the *Volksturm*. The Germans allocated most of their forces to the front lines, thinking that the Allied forces would never reach the Rhine River, 40 miles behind the German defensive positions. This left minimal troops to reinforce their rear.

The bridge commander in Remagen, Captain Willi Bratge, had to rely on the *Volksturm* for the bulk of his forces. All over Germany, *Volksturm* troops were conscripted and committed close to their homes in the hope that they would fight to defend their homes and localities. These forces discovered that every time they showed resistance, the American forces methodically demolished every structure that could house defenders. It did not take long to discover that a quick surrender spared their lives, homes, and property.[3]

The German soldiers in the bridge security company were attached from a convalescent unit, where they were recovering from wounds. Most of them were still wearing bandages. During one of several air raids on the city of Remagen, the ferries used to transport workers and civilians from one side of the Rhine to the other were destroyed. In addition, German policy refused to allow planning for rear area defense in depth. All of the above, each of which had a profound effect on the outcome of the battle, help explain the minimal resistance provided by the German forces.

When the American Soldiers of the 9th Armored Division arrived at Remagen, they came upon almost no hindrance between the city's entrance and the Ludendorff Bridge. Due to the low morale of the *Volksturm*, the obstacles they had built were too weak to block tanks, the roadblocks they had emplaced allowed ample room for vehicles to pass, and some obstacles had been emplaced in open terrain.[4] Because most of Captain Bratge's forces consisted of the *Volksturm*, he had counted on them to provide the greatest defense in the city. However, the *Volksturm* had deserted and most of the main German force was located at the eastern side of the bridgehead. In addition, the members of the bridge security company were virtually useless in combat. Once troops from the convalescent unit became strong enough, they were sent back to rejoin combat units, and few replacements were sent.

The destruction of the ferries forced large amounts of civilian traffic across the Ludendorff Bridge. The German troops securing it had to check passes and keep people moving. This took away from the time the troops had to prepare defenses and demolitions. German policy allowed for few prepared defenses; little time to emplace; and no antitank ditches or mines, barbed wire, or trenches on the way to the Rhine. This allowed the 9th Armored Division to arrive at the bridge rapidly with few casualties, and German resistance at the bridge soon found it was not strong enough to withstand this unweakened American force.

Lessons Learned. Several lessons can be drawn from this key event. Due to Hitler's prohibition of defense in depth and the failure of the *Volksturm*, the German forces had no defensive plan in Remagen. By the time the Americans arrived there, the Germans had neither time to emplace an effective defense nor enough troops to defend the city. If obstacles or defensive positions had been emplaced, the Germans could have delayed the Americans' speed crossing the Ludendorff Bridge. The first company to cross the bridge consisted of dismounted infantry, and with machine guns mounted in the buildings, the Germans could have easily reduced these Soldiers. Tank ditches dug around the city and antitank mines emplaced along the routes to Remagen could have prevented Company A, 14th Tank Battalion—under the command of First Lieutenant Karl Timmermann—from reaching the western banks of the Rhine. In turn, these tanks would have been delayed in decisively engaging the German flak guns on the eastern banks. Preparing a proper defense would have significantly diminished U.S. capabilities and assets available to attack the bridge. In addition, the delay could have given the German forces adequate time to mount a counterattack.

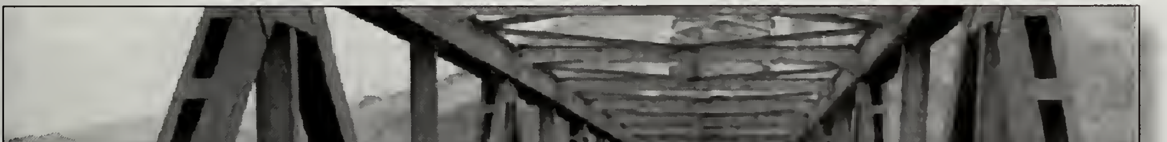
Doctrinal Guidance. The lessons learned from this key event are covered in United States Army doctrine. Field Manual (FM) 3-90, *Tactics*,[5] states that the defender does not wait passively to be attacked but aggressively seeks ways to weaken attacking forces before the initiation of close combat. The German forces at Remagen waited on the eastern banks of the Rhine River while the 9th Armored Division approached. They did nothing to weaken the American forces before they reached the bridgehead. FM 3-90 also states that a defense is more effective when there is adequate time to thoroughly plan and prepare defensive positions. Between the overcrowded traffic on the bridge and the official prohibition of defense in depth, the Germans forces at Remagen had no time to emplace a thorough defense.

Failed German Demolition Attempt

The failed attempt by the Germans to destroy the bridge with preemplaced explosives presents the second key factor in the successful U.S. operation. This failure was caused by many factors. During World War I, the French Army had occupied the Remagen area. While in charge of the Ludendorff Bridge, they discovered that each stone pier supporting the bridge contained two large demolition chambers that could be packed with explosives for easy destruction in case of an enemy attack. The French filled these chambers with cement.[6]

Weeks before the U.S. attack at Ludendorff Bridge, another German bridge had been inadvertently destroyed when an Allied bomb set off pre-positioned demolitions. Orders went out that all demolition material was to be removed and replaced on bridges only when an Allied army attack was imminent. Also, those responsible for losing a bridge to the enemy or for blowing up a bridge too soon faced a possible death sentence. Finally, Captain Friesenhahn ordered 600 kilograms of explosives, the amount determined necessary to destroy the bridge, but only received 300 kilograms. The type of explosives he received was an industrial explosive, which was less powerful than the regular military grade.[7]

The effects of these causes provide insight on how the bridge was taken. When the Germans began plans to demolish the bridge in case of attack, they discovered that the only way to remove the cement from the wells in the piers was to remove the main supports of the bridge, which could collapse the entire bridge.[8] Second, Hitler's order not to emplace explosives until an attack was imminent had a psychological effect on the engineers guarding the bridge. If any of the engineers armed the explosives too soon, they could suffer the death penalty. Third, the explosives on the Ludendorff Bridge were not detonated until the U.S. tanks were on the



U.S. Soldiers examine damages to the Ludendorff Bridge at Remagen, March 1945.

Present-day Remagen Bridgehead

western banks of the river, giving no time to adjust to the failed attempt. Last, due to the shortage of explosives and their low quality, the explosion inflicted minimal damage on the bridge. A main member of the bridge was damaged and a 30-foot hole was blown in the structure, but the bridge itself remained standing.

Lessons Learned. This key event presents a number of lessons. Although the engineers were not provided with the correct amount or type of explosives to blow the bridge, they failed to improvise with the supplies they had. If their limited amount of explosives had been placed in more effective positions to yield a larger explosion in one specific part of the bridge, they might still have collapsed the bridge or at least caused major damage. Instead, the Germans attempted to complete the previous plan with half the amount of explosives required. Furthermore, they failed to properly allocate supplies, insisting on sending large amounts to the front lines, which incapacitated the rear defenses. Once the German forces realized the Americans were encroaching on the Rhine River, they failed to respond in a timely manner or adapt to the changing situation by allocating supplies to the Rhine River bridges.

Doctrinal Guidance. The lessons learned from this event are also covered in U.S. doctrine. FM 3-34, *Engineer Operations*, states that responsiveness is "providing the right support in the right place at the right time."[9] It includes the ability to anticipate operational requirements and involves identifying, accumulating, and maintaining the minimum assets and capabilities to meet the support requirements. Flexibility is the capability to adapt logistical availability based on changing situations, missions, and concepts of the operation. Flexibility may also include improvisation, which is the ability to make, invent, or arrange what is needed from what is on hand. The Germans failed in all three aspects by neglecting to allocate necessary supplies at the right time. In turn, the engineers did not receive the right amount or type of explosives.

Communications Failures

The third key factor in the success of the American forces was caused by the limited communications in Remagen. The means of communication and transportation available to the German troops at Remagen were very meager. Until the beginning of March, neither Captain Bratge nor Captain Friesenhahn had a vehicle. The radio and telephone apparatus available to the Remagen commanders, although serviceable in normal times, was inadequate for an emergency. One telephone line connected the bridge to the regular German army line running between Bonn and Koblenz, and another line was connected by a civilian adapter to military district headquarters in Wiesbaden. Frequent bombings disrupted the lines for long periods, but even when undamaged, they were so busy it usually took a full day to complete a telephone call. For contact with the attached units in Remagen, Captain Bratge had to depend on the civilian telephone system, which was fairly reliable in normal times. However, electricity was needed to operate the line and could not always be obtained during combat. Also, the line had a tendency to go dead suddenly when jarred by explosions, and it remained dead for weeks after a large bombing attack.[10]

The limited means of communication had multiple effects. When First Lieutenant Timmerman's few men on the east bank were most vulnerable, Major Scheller, the German commander, left the battle to find reinforcements, leaving Captain Bratge to conduct a counterattack. The ineffective communication systems at Remagen made it nearly impossible to contact any units outside of the defenders' immediate area. Without adequate transportation, the fastest means of contact was by bicycle. Major Scheller did not arrive at the 67th Corps Headquarters until 10 March. The possibility of German forces conducting an effective counterattack on the 9th Armored Division was nonexistent.

Lessons Learned. The main lesson offered in this event is the importance of communication on the outcome of a battle. The inability of the German forces to contact higher headquarters or any of the surrounding units made it impossible to conduct an effective counterattack. The minimal forces on the eastern banks were not strong enough to defeat the U.S. attackers. When the Soldiers of Company A, 27th Armored Infantry Battalion, arrived on the eastern banks of the river, they had been beaten down by constant fire from the German flak guns and snipers, and the unit was at its weakest point. If the German higher headquarters had prioritized communications and transportation assets at Remagen, Major Scheller would have been able to reach them and surrounding German units with enough time to prepare for a counterattack. Destroying Company A would have prevented the American forces from gaining a foothold on the eastern banks and taking the heights of *Erpeler Ley*. With American forces stuck on the western side of the river, the Germans would have had time for reinforcements to arrive.

Doctrinal Guidance. U.S. doctrine portrays the importance of an effective counterattack. FM 3-90,[11] states that the commander directs a counterattack to defeat or destroy enemy forces, exploit an enemy weakness, or to regain control of terrain and facilities after an enemy success. The commander plans and conducts a counterattack to attack the enemy when and where he is most vulnerable, while he is attempting to overcome friendly defensive positions. In every way, the situation was right for the Germans to conduct a successful counterattack on Company A. If the Germans' communications had been more effective—so they could have contacted another unit to reinforce them—they probably would have destroyed the American forces on the eastern banks and gained the time to receive the necessary reinforcements.

Summary

American forces captured the Ludendorff Bridge by an effective use of massing the effects of fire, rapidly conducting the operation, and taking the initiative. The German forces at Remagen relied heavily on the *Volksturm*, an untrained civilian force, leaving an ineffective defense within the city and limited firepower arrayed against the 9th Armored Division units. The highly trained American forces, upon reaching the banks of the Rhine River, integrated the fires of their tank companies in multiple positions and engaged the German forces on the east banks with massed firepower. This allowed Company A, 27th Armored Infantry Battalion, to successfully cross the bridge and secure the bridgehead. The German forces were often slow to adapt to changes and often failed to effectively react. From their positions atop *Erpeler Ley*, the Germans could see the approach of the American forces, allowing ample time to blow the bridge or even retest the explosives. Seeing the size of the American force and knowing their composition, the Germans knew they were outnumbered and should have attempted communication with nearby units much sooner. The American forces moved rapidly from the start of the operation, adapting to change with little or no pause. When the 9th Armored Division Soldiers were given the mission to cross the Rhine River, they did not know that the Ludendorff Bridge was still standing. The American forces adapted to the situation and took the initiative to conduct a bridge-crossing operation within hours of discovering the still-standing bridge.

Captain Halloran is the operations and training officer of the 169th Engineer Battalion, Fort Leonard Wood, Missouri. Previous assignments include platoon leader with Bravo Company, 9th Engineer Battalion, in Schweinfurt, Germany, with which he deployed to East Baghdad as part of Task Force 1-26 Infantry. He holds a bachelor's in biology from John Carroll University in University Heights, Ohio, and is a graduate of the Engineer Officer Basic Course, the Safety Officer Course, the Unit Movement Officer Course, the Explosive Ordnance Clearance Agent Course, and the Engineer Captains Career Course.

Endnotes

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[4] Ibid., p. 41.

[5] FM 3-90, *Tactics*, 4 July 2001.

[6] Hechler, p. 58.

[7] Oyloe, Donnell, Gilmore, Hagan, Hardie, p. 45.

[8] Hechler, p. 58.

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Studies Define Solid Waste Stream at Base Camps

By Mr. Gary Gerdes

Base camp planning typically does not include a strategy for long-term management of nonhazardous solid waste, because this issue has low priority compared to other operational concerns. However, for camps that endure and evolve toward semipermanent status, solid waste quickly becomes a very large problem. Ideally, longer-term plans would put equipment and services in place when needed to handle the waste produced.

Solid Waste Studies

Before planners can identify ways to manage solid waste at base camps, they need to know the types and amounts of waste to be expected. Two studies completed by the United States Army Engineer Research and Development Center (ERDC) characterize, for the first time, the makeup of solid waste generated at military base camps. The findings are published in two ERDC technical reports and summarized in a public works technical bulletin (PWTB) issued by the United States Army Corps of Engineers.[1]

ERDC's Construction Engineering Research Laboratory (CERL) conducted the studies at two base camps in the Balkans. The sites included Camp A, which in 2003 had recently transitioned from contingency operations (CONOPS), and Camp B, which in 2006 had matured to semipermanent infrastructure capable of sustaining long-term missions. The research covered only nonhazardous solid waste such as plastic, light metal, paper and cardboard, scrap wood, sewage sludge, ashes, and miscellaneous trash.

Solid Waste Types

Results showed that the types of solid waste produced at the two camps were roughly similar. However, the amounts of specific waste types differed greatly. For example, much more plastic trash was found at the transitioning CONOPS site, Camp A, than at the more established Camp B. This was probably due to gradual replacement of single-serving bottled water with central distribution points for purified water at the older camp. The table on page 71 summarizes the waste produced at each camp. (Sites are not identified for operational security reasons.)

Plastic. The number of plastic bottles significantly decreased from 2003 at Camp A to 2006 at Camp B. This is likely due to efforts in the Balkan camps to provide bulk drinking water supplies to replace bottled water. However, the generation of "other plastic" significantly increased, possibly due to increased post exchange (PX) services on the base camps, which created an increase in disposal of plastic packaging.

Photograph courtesy U.S. Army Engineer Research and Development Center

To characterize the waste stream at both base camps, garbage was first sorted by category.

Light Metal. The light metal increased in 2006 at Camp B, perhaps because of an increase in the disposal of metal cans by the dining facility, where fewer meals, ready-to-eat, were issued, and more canned drinks became available at the PX.

Paper and Cardboard. The amount of paper and cardboard generated per person almost tripled from the 2003 Camp A sorting to the 2006 Camp B sorting. The greatest increases were in paper. This may be due in part to a fully stocked PX and

Results of Characterization Studies

	2006 Data (Camp B)		2003 Data (Camp A)	
Component	lb/person/yr	Percent	lb/person/yr	Percent
Plastic bottles	196	3.0	295	5.1
Other plastic	502	7.6	143	2.5
Aluminum	46	0.7	10	0.2
Light metal	202	3.0	11	0.2
Cardboard (and paper)	529	8.0	349	6.1
Other paper	974	14.7	179	3.1
Food and vegetation waste	609	9.2	418	7.3
Textiles	95	1.4	25	0.4
Glass	37	0.6	40	0.7
Rubber	4	0.1	4	0.1
Polystyrene	21	0.3	9	0.2
Scrap wood	1076	16.2	4151	72.1
Sewage sludge	688	10.4	70	1.2
Ashes	811	12.2		0.0
Miscellaneous	838	12.6	52	0.9
Total	6627	100.0	5756	100.0

disposal of packaging. A high moisture content undoubtedly contributed to the high generation rate as well.

Scrap Wood. The amount of scrap wood showed a decrease of 75 percent in 2006 at Camp B compared to 2003 at Camp A, which might be attributed to two factors: Camp A in 2003 may have had more construction activities that created a large amount of construction debris; and it may have been more dependent on goods shipped from the United States, as opposed to the local economy, where goods were not palletized and arrived in smaller trucks.

Sewage Sludge. The huge increase in sludge generation cannot be explained. The sewage sludge reported in the 2003 Camp A survey was reported as dried solids. The moisture content of the sludge reported in the 2006 Camp B survey was not known, but was probably somewhat dry according to pictures in the report. It is possible that at the 2006 survey site, sewage sludge was collected from other base camps for disposal at the composting facility, thus raising the apparent generation rate.

Ashes. The results of the 2003 Camp A survey were based on the waste before incineration, because all wastes at Camp A were incinerated. The camp where the 2006 Camp B survey was done used an incinerator to dispose of items for security reasons, such as uniforms and documents. Since these items were always incinerated to ash, the ash was considered to be a component of generated waste. The materials that were incinerated were not included in other component fractions.

Miscellaneous. This category was significantly higher in the 2006 Camp B survey. Descriptions of the waste being sorted indicated that it was much wetter in 2006 than in 2003 at Camp A, making it more difficult to sort. It is also possible that the workers in 2003 were much more diligent at pulling apart compressed waste.

Conclusion

By understanding the types of solid waste produced under different circumstances, military base camp planners will be better able to develop strategies for its disposal. This information will enable proactive efforts to procure equipment and services to handle the waste in a timely fashion and ensure sustainable base camp operations.

Mr. Gerdes is a researcher at ERDC–CERL. During his 35 years at CERL, he has conducted studies in the areas of solid waste processing and management; oil-water separator design and management; and tactical vehicle washing. He holds a bachelor's from the University of Illinois and a master's from the University of Missouri. He can be reached at (217) 373-5831 or <gary.l.gerdes@usace.army.mil>.

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Getting the Right Answers

By First Lieutenant Kelly Lanternier

Photo by Specialist Josiah E. Johnson

With a clear view of the bridge in the background, the MANSCEN engineers can see the problem and receive valuable feedback from the engineers on the ground.

In the current operating environment in Iraq, it is more important than ever to have all of the right answers. But what do you do if you are an engineer officer who is uncertain of the correct answer in a particular situation? The solution is easy—use the engineer "reachback" capability. The reachback capability is nothing new. The United States Army Engineer Research and Development Center (ERDC) has been using it for years, but unfortunately, awareness of this great resource is either unknown or unused by most engineers. Just recently, the 561st Engineer Company "Warriors" in Iraq learned just how valuable that resource is.

The reachback capability provides engineers in remote locations access to unique subject matter experts. This system connects the engineers with questions to the engineers with answers. ERDC employs highly educated, well-qualified professionals with diverse engineering degrees to help tackle any problem, and they are available to Soldiers on the ground 24 hours a day.

Engineers from the 561st were assigned the mission of constructing an unimproved road to provide freedom of maneuver to an armor task force near the Iranian border. Along the route was an unclassified bridge with no known load classification capacity. Field manuals only account for maximum load capacities (MLC) up to certain limits and knowing the exact MLC of the bridge became extremely important to the maneuver units on the ground, which have various pieces of heavy equipment of many different weights.

The professionals at the United States Army Maneuver Support Center (MANSCEN), at Fort Leonard Wood, Missouri, were quick to jump aboard to help when the 561st contacted them via e-mail. The 561st engineers provided MANSCEN with all of the known dimensions and data. In addition, the 561st engineers were able to communicate on-site using a device called the TeleEngineering Toolkit, enabling the engineers at MANSCEN to "see" the problem.

Essentially, the TeleEngineering Toolkit is a video teleconferencing unit hooked up to a laptop computer and a mobile phone. With a precoordinated linkup time, the system lets both parties communicate in real time. After compiling all the necessary information, a team of stateside bridge engineers was busy writing down formulas and going over equations, ultimately concluding that the bridge was not safe for tracked vehicles weighing more than 82 tons.

Engineer reachback is not limited to bridge classification. It can be used in almost any situation where engineers have limited resources to solve complex problems. The subject matter experts at MANSCEN are equipped with engineering expertise ranging from the history of a specific watershed to building designs to soil stabilization methods. One of the most important lessons learned by the deployed Soldiers of the 561st Engineer Company—do not hesitate to refer problems to the qualified engineers at MANSCEN.

First Lieutenant Lanternier is the executive officer of the 561st Engineer Company (Horizontal), 84th Engineer Battalion, deployed to Iraq for Operation Iraqi Freedom. Previously she was a platoon leader with the 643d Engineer Company (Vertical), 84th Engineer Battalion, Schofield Barracks, Hawaii; and platoon leader for the 561st Engineer Company. She holds a bachelor's in civil engineering from the United States Military Academy. In 2007, she passed the fundamental engineering exam and is now an engineer in training.

Waste-to-Energy Systems

By Mrs. Rebecca C. Wingfield

One of our newest resources is common, everyday trash. "Basic" science tells us that all objects have energy, whether they are trash, scraps, or treasure. Therefore, with the energy situation we are in, many have begun—or already had been—looking at our newest resource for energy. After all, a British thermal unit (BTU) of trash is the same as a BTU of petroleum. This idea has the potential to make companies a lot of money if they can solve some of the problems associated with turning waste (trash) into clean energy.

Clean energy is the crux of the problem. In former times when it was common, open burning of trash was smelly, dirty, and not very efficient. The Environmental Protection Agency (EPA) was created in 1970 with a mandate to clean up and protect the environment, so open trash burning in dumps in the United States became a thing of the past.

". . . [President Nixon] and Congress worked together to establish the ... EPA ... in response to the growing public demand for cleaner water, air, and land. Prior to the establishment of the EPA, the federal government was not structured to make a coordinated attack on the pollutants that harm human health and degrade the environment. The EPA was assigned the daunting task of repairing the damage already done to the natural environment and to establish new criteria to guide Americans in making a cleaner environment a reality."[1]

The next phase was to burn trash in special incinerators to produce heat energy, which was done on several college campuses and some military installations. Many of these incinerators shut down in the 1980s due to tougher air pollution regulations. Now, we are considering using municipal solid waste (MSW) (trash) to produce energy (electricity) for cities and elsewhere.

Systems Under Development

Technology is advancing, and several types of systems for producing energy are being tested:

Tactical Garbage to Energy Refinery

Last summer in Iraq, a system was tested called "Tactical Garbage to Energy Refinery" or TGER (pronounced "Teeger").

"TGER is small enough to fit into a CONEX [military shipping] container, but . . . [powers] a standard 60-kilowatt generator. TGER works by turning the solid [mixed waste] trash into fuel pellets which are fed into a down-draft gasifier. The gasifier [another word for a pyrolysis system] then heats the pellets, and breaks them down into a synthetic gas [syngas] composed of simple hydrocarbons that resembles low-grade propane. TGER processes the liquid and food waste into a hydrous ethanol, which is blended with the syngas to create usable energy. It takes TGER six hours to fully power up, during which time the amount of diesel fed into the machine slowly drops, until the generator is powered by less than one gallon of fuel per hour, as compared to five per hour without TGER."[2]

TGER's fuel is a mixed waste stream of sorted MSW of papers, plastics, and food-slop garbage. TGER, as it was tested, does not process glass, metals, or hazardous waste streams like medical wastes. This waste must still be processed some other way, but TGER is a step in the right direction.

Swearing in of the first Environmental Protection Agency administrator in 1970.

Biotechnologies

The Army has seen the opportunity to use biotechnologies to solve real problems to provide energy to power generators, and so forth, which provide about half of all the energy used at most forward operating bases (FOBs).[3] A new biorefinery from the United States Army Research, Development and Engineering Command (RDECOM) could cut down on the need for some of the fuel convoys during deployments. *"The two 4-ton machines were designed to fit into standard ISO [International Organization for Standardization] containers, bringing the technology down to a size that is easily transportable."*[4] According to RDECOM, the technology itself is not new:

> *"What's new about it is the way we put together two different technologies to have a hybrid. First, all the garbage is fed into a chute . . . ground . . . pelletized and gasified. . . Advanced fermentation is used for the food slop and field rations, which get converted into hydrous ethanol. We take those two streams and we blend them, and it gets aspirated into a standard Army generator set . . . a TGER unit can handle about a ton of garbage a day,"* creating a potentially significant alternative fuel source for the military. *"So if we can keep some of the convoys off the roads . . . drastically cut down on fuel use, it's a good thing all around. The only other byproducts from the TGERs are ash . . . a benign soil additive, and water . . . Once the TGER is ready for prime time, there's likely to be plenty of need for the units, and not just in the Army. The potential for their use at something like a post-Katrina event is huge, because there was plenty of garbage, plenty of trash, but no power.* [Other uses for them could be] *. . . at campsites, at hospitals, at schools,"* or wherever there are people creating masses of trash.[5]

Pyrolytic Gasification

Pyrolytic gasification is not a new term. *"The principles were first brought forth in 1958 at Bell Laboratories within the United States. . . . Thereafter, a number of universities and organizations around the world started R&D [research and development] programs. The word pyrolysis, meaning chemical change brought about by heat, is widely used— even by incineration technologies, which have tried to escape their roots in oxidation and combustion because of the problems prevalent with both. Gasification is . . . the chemical reaction and molecular breakdown or degradation of materials.*

> *The first pyrolytic gasification systems were brick ovens that used indirect heat/low oxygen.... Waste was placed into the unit, the unit was sealed, and heat applied. After the process of degradation was completed, the oven was opened and emptied to make room for the next batch. Therefore, these systems were known as batch-by-batch systems. This format was first introduced commercially in the early 1970s."*[6]

Across the pond, the Royal Navy is using technology to produce energy from waste with pyrolysis technology from QinetiQ.® *"As landfill sites become increasingly overloaded and refuse disposal an escalating problem, engineers have perfected a technology that not only breaks down waste to just a fifth of its previous volume, but generates energy at the same time."*[7]

In this technique of burning waste without oxygen, *". . .pyrolysis as a method of waste disposal provides a host of potential benefits. Unprocessed waste can be treated in a burner to reduce its mass by 80 percent. The end product is an inert ash, which itself is useful and can be bonded to form the lightweight blocks used for building internal walls. Additionally, pyrolysis has the potential to generate 'green'*

***HMS Ocean* received a pyrolysis unit in 2008.**

Contractors install the Tactical Garbage to Energy Refinery (TGER) in Iraq.

energy as a byproduct. Pyrolysis yields an 80 percent heat output: if you put 100 kilowatts of energy into the process, it produces 80 kilowatts of heat energy. This heat can be used to power a steam turbine to generate electricity."[8]

Although this process affords the benefits of cutting down numbers of personnel and saving valuable space, *"the pyrolysis system has not been without considerable engineering challenges, however. The system is shaped like a tube, into which the waste is inserted at one end. A screwlike device then pushes waste along the tube at enormous pressure. As the waste passes through, it is heated—without oxygen—to between 800 and 1,100 degrees celsius (C). By the time it reaches the end of the tube, it has been reduced to a grey ash, which can be emptied out. The heat energy by-product of the process is fed back into the system and is used to drive the device so that, once started, it effectively becomes a self-driving process. The ship-based burners are designed to handle 2.8 tons of waste per day—roughly the amount of waste produced by the ship's complement."*[9]

Modular and Containerized Technologies

Several research and development systems have been developed that integrate technologies into modular and containerized systems. These systems usually consist of a solid waste management system, a water purification system, a power generation system, and/or living units. One of the requirements of a modern military force is that it be modular and scalable, which this system is. Approximately 20 ISO containers can carry one system that provides virtual self-sufficiency for a community of 500 people in drinking water and waste management. The plant, which is capable of dealing with about 2 tons of mixed solid waste per day, will destroy wood, paper card, food, plastics, and sanitary, clinical, and oil waste and satisfies the emission requirements of the European Union. This system is supplemented by harvesting water from the air and from the diesel generator exhaust gas stream. When burned, diesel fuel generates a useful amount of water vapor. The exhaust gas stream from the diesel generator is processed to remove the entire water content, which is then sent to the liquid waste plant for purification. As newer technology becomes available, other containers could easily be integrated into the system.

Waste Streams

"A wide variety of waste streams can be used for power production . . . The moisture content in sewage sludge and other toxic liquids or waste materials having high oxygen content will be dehydrated prior to system introduction. A material recovery facility—sometimes referred to as a municipal recycling facility (MRF)—for front-end material handling will be waste-stream specific in design. Liquids will be conveyed by a cavitation pump, whereas solids are generally transported by a conveyor system.

Transportable electrical power that is generated by the process is in the region of 3.8 kilowatt-hours per 7000± BTUs, which is the average value per pound produced by MSW—one of the lowest in calorific value. Higher BTU values of 14,000+ per pound in materials such as rubber or plastics will produce 8+ megawatt-hours. Incineration systems are typically 50 percent efficient, but with [most pyrolysis systems], 75 to 90 percent of the BTU value (depending on the waste stream) is available as an energy source."[10]

Summary

Waste-to-energy is a way to use MSW and other waste streams to produce electricity for use in cities and elsewhere. For the military to use this technology, it must be scalable and modular. Current research in systems such as TGER, biotechnologies, pyrolytic gasification, and modular and containerized technologies is yielding more economical and environmentally protective solutions for clean energy. Waste-to-energy systems are the wave of the future for many reasons, but mostly because they are the smart and right thing to do.

Mrs. Wingfield is a civil engineer working for the United States Army Engineer School at Fort Leonard Wood, Missouri, in the Directorate of Environmental Integration. She previously spent 13 months with for the United States Army Corps of Engineers as a project engineer stationed in Basra, Iraq, and at Contingency Operations Base Adder near Nasiriyah, Iraq. She has also worked at Fort McClellan, Alabama; for the Department of Defense Dependent Schools in the Federal Republic of Germany; and for the state of Illinois. She holds a bachelor's in civil engineering from the University of Missouri-Rolla (now Missouri University of Science and Technology). In January 2009, she was awarded LEED-AP accreditation (Leadership in Energy and Environmental Design—Accredited Professionals) by the United States Green Building Council (ISGBC), of which the United States Army is one of the leading members.

Acknowledgment

Special thanks go to Dr. James Valdes, scientific advisor for biotechnology at the Army's Edgewood Chemical Biological Center, United States Army Research, Development and Engineering Command, Aberdeen Proving Ground, Maryland, for his considerable input to the Ehrlich and Kyzer articles.

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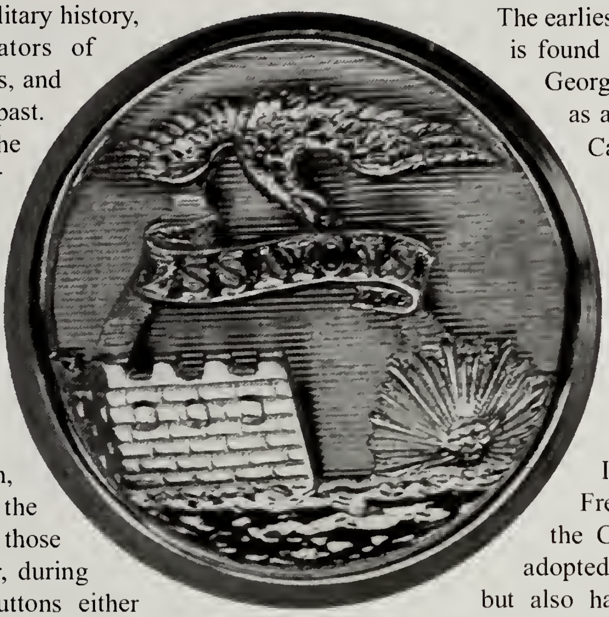
The Essayons Button

By Dr. Larry D. Roberts



As with many aspects of military history, the origins and originators of military customs, emblems, and insignia are lost to the mist of the past. This is certainly the case with the distinctive button worn by engineer officers—the Essayons Button. Evidence does suggest that it is the oldest uniform element or emblem unique to the Corps of Engineers.

The history of the Essayons Button can be traced to the earliest days of the Corps of Engineers. As early as the American Revolution, there was an effort to distinguish the uniforms of the engineers from those of the rest of the Army. However, during the Revolution, officers wore buttons either identifying them with their states, if they were militia, or with "USA," if they were with the regular Continental Army.

In 1794, Congress authorized a regiment of artillerists and engineers that took station at West Point, New York. In time, the officers of this regiment wore a button with an eagle standing on a field piece. Later, the eagle disappeared and the inscription USA&E, for U.S. artillerists and engineers, was placed on the button. In 1802, the artillery and engineers were separated, forming their own independent corps. Once again, efforts were initiated to create something that could distinguish engineer officers from those of other branches or arms.

Sometime between 1802 and 1814, the design for the Essayons Button was developed. At that time, the Corps's primary mission was the construction of coastal fortifications. The first Commandant of the United States Military Academy, and Chief Engineer, Major Jonathan Williams, was given the freedom to develop uniform items for the Corps and the cadets at West Point. A map of the coastal fortifications at Charleston, South Carolina, drawn in 1806, shows an eagle with a scroll in its beak with the word "Essayons"—the first time that this French word, meaning "we will try," is found on a formal document produced by the Corps. A map made of the defenses of New York Harbor the following year also had an eagle and the word "Essayons." In addition, it had a water bastion, and rays depicting the rising sun. Therefore, by 1807, all of the elements of the Essayons Button had been adopted and used by officers of the Corps.

The earliest reference to the Essayons Button is found in an account written by General George D. Ramsey. Recalling his days as a cadet in 1814, he noted that "… Captain Partridge was never known to be without uniform… His was that of the Corps of Engineers, with the embroidered collar and cuffs and the Essayons Button…."[1] Clearly, Major Williams and other officers of the Corps had arrived at a design for a button to distinguish the uniform of the engineer officer. Influenced by the historic ties with French engineers, the leadership of the Corps of Engineers had not only adopted the French term "Essayons" but also had incorporated it into a button showing the principal mission of the engineers—fortification.

In 1840, the War Department officially endorsed the button for the Corps of Engineers. General Orders 7, Adjutant General's Office, dated 18 February 1840, described the button as "an eagle holding in his beak a scroll with the word 'Essayons,' a bastion with embrasures in the distance, surrounded by water, and rising sun…."[2] Of interest, the same general order also authorized the turreted castle for wear by engineer officers. Coincidentally, the Commanding General of the Army at that time was Alexander Macomb, a former engineer officer.

The Essayons Button was, therefore, uniquely associated with the Corps of Engineers. When the Army adopted a standard button for its uniforms in 1902, the Corps already had almost a century of identification with the Essayons Button. Consequently, the Corps of Engineers was the only branch authorized to retain a distinctive button on the uniforms of its officers.

Dr. Roberts is the Director of Historical Programs, United States Army Engineer School, Fort Leonard Wood, Missouri.

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UNITED STATES ARMY ENGINEER SCHOOL

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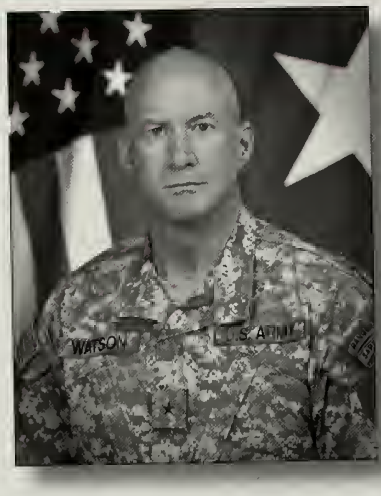
Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School



As the Commandant of the Regiment, one of the key tasks I've charged you with is "Breeding the Army's Most Adaptive Leaders… Inspired With Passion." Our noncommissioned officers (NCOs) play the most crucial role. They are heralded as the backbone of the Army, but our NCO Corps is far more than that…far more vital to the life and legacy of this Regiment. Our NCOs—from sergeant to command sergeant major—are our Regiment's DNA, responsible for breeding leaders. Let me explain and then give you a challenge.

From the outset of my career, I was—and still am—awed by the role our NCOs play in the combat effectiveness and long-term vitality of our Regiment and our Army. Sometimes we don't see it…or perhaps we have grown so accustomed to being surrounded by super NCOs that we take it for granted. But have a discussion with a leader of any other nation's army, and it will quickly turn to the extraordinary professionalism of our NCO ranks. They see it immediately and attribute the superiority of our Army to one thing…our NCOs. It has been that way since our birth as a Regiment, an Army, and a Nation.

We often use various parts of the human body as analogies to describe someone's contribution to the team. The cliché that NCOs are the backbone of the Army has been around forever…accentuated by NCOs with great pride and resolve whenever they recite the NCO Creed. I suppose that it alludes to a number of attributes—our Army's courage to stand up for what is right being just one of them. But we also describe the role of NCOs as the eyes and ears of the commander, the muscle that propels the unit into action, the shoulders that do the heavy lifting, the brains that organize a unit for the mission, the hands that mold future generations of Soldiers, the backs on which a unit's success rides, the heart of any organization, the exacting eyes that ensure unit discipline and guarantee readiness, the soul that keeps us going in adversity, and the conscience that discerns right from wrong when confronted with ambiguity. No doubt, NCOs are all these things and more.

No single analogy fully describes the premier role of the NCO in our Army or captures our reliance on them as a Corps. But I'll add one more analogy to the mix because I believe it captures the most important responsibility of our NCO and Corps. It is one they alone own. The Corps of NCOs is our Regiment and our Army's DNA—that complex code found in all living cells. It is the living set of instructions that is passed from one cell to another during growth and tells the new cell (1) what it is to be, (2) what function it is to accomplish and how it fits in, (3) what form it is to take, and (4) how it contributes to the larger organ and its sense of belonging to something bigger than self; and ultimately, (5) it gives the body its unique identity and form. Like our NCOs, we don't really see our DNA or its function. However, it is fundamental—the very essence of who we are.

Let me give you some examples of how NCOs pass on our Army's DNA. It is the NCO that is the Soldier's first and lifelong example of what right looks like. Every time an NCO interacts with a Soldier—on or off duty—there is a form of cell division that takes place. It passes on the enduring values and leadership traits that are unique hallmarks of our Army to the newer generation. As our primary trainers and coaches, NCOs have the responsibility to inculcate Soldiers with the necessary skills, inspiration, and gut-feel to be effective members of the team, unit, and Army. NCOs transform our Nation's youth into Soldiers… into Warriors…and then into Warrior Leaders. NCOs give Soldiers their very form and function and, in so doing, shape our Army. They breed their replacements! And it is the NCO who is an officer's very first teacher, coach, and sometimes mentor—an officer's most trusted and important advisor throughout his/her career. NCOs are experts—technically and tactically—and teach the officer to bridge from classroom theory to combat application. They coach leadership and keep officers grounded in Soldiering and Soldiers. They inspire us that we may inspire others. No matter what rank, we learn who we are from our NCO Corps.

So here is the question and my challenge to you: Have you promoted good "cell division" within your outfit? Do you foster a climate that allows NCOs to fulfill their role and obligation as the Engineer Regiment's DNA? To our NCOs, are you actively passing on the DNA that is vital to our Regiment's success and legacy? Are you helping police our ranks to ensure that the right DNA is passed on to new generations? Make it a priority; look for opportunities! Don't do it because this is the Year of the NCO, but because our future depends on it…perhaps now more than ever.

Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School

My Other Battle Buddy

The Regiment and its Soldiers have to keep pace with growing technologies to continue to be relevant on the battlefield. The acceleration of technology is growing exponentially: What used to take twenty years to progress now takes five.

A pleasant surprise we've seen in the last five years is the birth of a new friend on the battlefield—the robot. No more going out and investigating whether an improvised explosive device (IED) is real or fake. Got to clear a danger area? Call on your "Other Battle Buddy," the robot. The technology that went into building today's robot gives us enough situational awareness to allow us to make an informed decision. How much better will robots be in another five years?

Unmanned aerial vehicles (UAVs) were used in combat before the ground versions. World War I started the concept by miniaturizing the Sopwith Camel and controlling the plane with radio frequencies. We continued to use UAVs in World War II as a training aid for antiaircraft gunners and also as attack aircraft.

The first use of ground robots in combat was at the Battle of Normandy in World War II. The German army's engineers operated a robot called the Goliath. The robot was 2 feet wide and 4 feet long and carried approximately 200 pounds of explosives. Operated by a German sapper using a telephone cable, the robot was designed to engage tanks and infantry formations and destroy buildings and bridges.

The Regiment's engineers are learning to use robots as a part of framework operations. For route clearance teams, using robotics is an everyday occurrence. Mounted on the exterior of vehicles, robotic arms and cameras allow Soldiers to investigate potential hazards without exposing themselves to the possible threat.

Robots unconditionally trust you to make the necessary decisions, and they are willing to go anywhere and do anything for you. You communicate with them either through a set of wires or by electronic signals. The speed of that communication is getting faster with the improvement of the computer (brain) and your reaction time, which will improve the more you work with your Other Battle Buddy.

What kind of improvements will we see in future robots? Some things we can expect is a better interface than what we're using now. The Army is working on a 3D simulator that trains Soldiers to go out on a patrol. It is only a matter of time before that type of interface is available for you and your robot out in the field.

A robot isn't limited by the size that we humans grow up to be: The size of a robot is entirely dependent on the task we require it to do for us. Routine tasks such as filling Hesco® barriers, searching confined areas, digging fighting positions, pulling security, recovering vehicles, performing routine maintenance, breaching obstacles, emplacing anchorage systems, surveying terrain, and crossing gaps are just a few tasks a robot can accomplish for the Regiment.

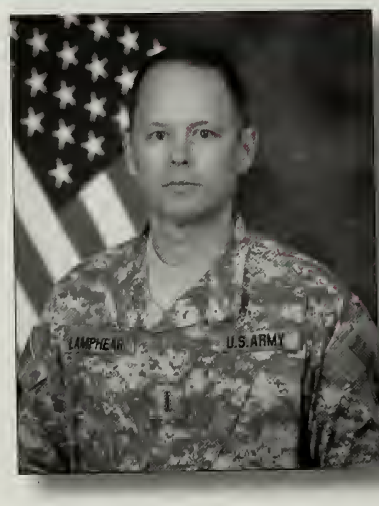
So let's hear from the Regiment. What are your opinions of your Other Battle Buddy? What would you like to see from tomorrow's robot? Send your ideas to me in an e-mail at <*bobby.wells@us.army.mil*> and we'll include them in the next issue of the *Engineer Professional Bulletin*, along with an exclusive interview by one of our engineer Soldiers with a combat-tested robot that just returned from a deployment.

Stay safe.

> ***"Where a new invention promises to be useful, it ought to be tried."***
>
> ***—Thomas Jefferson (1743-1826), U.S. Founding Father, drafted the Declaration of Independence, third U.S. President***

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer



Wow! This year's ENFORCE was everything that was promised and more. The conference featured two firsts: the inaugural Engineer Warrant Officer of the Year Award (see article on page 21) and the inaugural Council of Engineer Warrant Officers. I'm happy to report that 29 warrant officers attended our first Warrant Officer Council and information briefings.

The morning session included briefings from the Council members and a comprehensive Warrant Officer Education update by CW4 Mark Pitsenbarger of the Army Leader Development Office (ALDO). The afternoon session consisted of professionally facilitated discussions led by CW5 Mark Jensen, Command Chief Warrant Officer of the Kansas Army National Guard. The Council deliberated four main issues, and the recommendations are in various stages of implementation. The Council—

- Established a multicomponent recruiting committee to create a professional trifold advertisement for the 210A and 215D accessions program. Thanks to WO1 Dennis Connor of the United States Army Reserve for developing the first draft. The United States Army Recruiting Command has agreed to work with the Engineer School to fund the trifold as part of a pilot test for warrant officer recruiting.
- Voted to recommend to the Commandant that MOS 210A be renamed Construction Engineering Technician to formally recognize the change in mission requirements for this diverse MOS. These requirements, which support modularity and are driven by FM 3-0, *Stability and Support Operations*, include support of vertical platoons, survey and design teams/detachments, engineer brigades, maneuver enhancement brigades (MEBs), divisions, and corps.
- Will recommend to the Commandant that MOS 215D be renamed Geospatial Engineering Technician to better reflect the core mission of geospatial warrant officers and align this warrant officer MOS with its NCO feeder MOS, Geospatial Engineer.
- Validated the proposed change to the standards of grade for MOS 210A to reflect the changes in mission requirements being executed in both training and assignments of 210As.

CW4 Pitsenbarger provided a very timely update to the Warrant Officer Council that included the current status on the Warrant Officer Staff Course (WOSC) and Warrant Officer Senior Staff Course (WOSSC) redesigns. The redesigned WOSC, which was implemented in January 2008, will expand to a 5-week course in FY11 and include a revamped distributed learning (dL) phase. In addition, a CW4 technical functional course will be added as part of the WOSC. Army funding for development of the new 210A and 215D technical functional courses has been approved, and the Engineer School will soon receive the first year's funding allotment. The WOSSC, the capstone Professional Military Education (PME) for CW5s, has been increased from 2 to 4 weeks with a dL portion as well. The first pilot class will be conducted this summer, with final implementation in FY11.

Training experts at the Directorate of Training and Leader Development, led by CW4 Phil Mowatt, LTC Phillip Kaufmann, and Dr. Troy Messer, have received the Commandant's approval and support for the expansion of the 210A Warrant Officer Basic Course from 12 weeks to 26 weeks. This extraordinary effort, if approved by TRADOC, will fundamentally change both what we train and how we train our Construction Engineering Technicians. The submission of this program of instruction (POI) change addresses a shift in strategy for integrating 210A warrant officers in support of modularity, doctrine, and standards of grade changes. The new course will bridge the technical competency gap created under modularity and FM 3-0. More to follow as the staffing process continues with this major Engineer School initiative.

While the ongoing improvements in both leader and technical training at the institutional level are impressive, PME alone will not be enough to fully *Breed the Best Leaders* or *Build Great Engineers*. As the commandant stated, "Great leaders improve on the areas they are weak in." I challenge you to recognize your weaknesses and use the resources at your disposal to improve your leadership abilities and technical competency. Start and/or complete your civilian education with an engineering emphasis, enroll in dL courses, or complete certification courses related to your warrant officer specialty. Take the Commandant's challenge, and search out engineering firms at your duty station and develop training relationships—sabbaticals—for as little as 30 days or as long as 90 days, working with industry. Talk to your commander and get it started—today. Keep your technological edge—it's what makes you a warrant officer! Stay safe. Essayons!

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Focusing on the Regiment

Education, Training, and Experience

By Ms. Shirley A. Bridges

Lieutenant General Robert L. Van Antwerp, 52d Chief of Engineers, spoke at the 2009 ENFORCE Conference, using many of his own experiences when growing up to illustrate various aspects of education, training, and experience that were applicable to Army leaders. And instead of giving his views on the current state of the Engineer Regiment, he handed an index card to each person in the audience, and throughout his speech, he mentioned areas where he wanted input from the attendees to be written on the cards. Several of his topics came from books that are being used in the Building Great Engineers campaign.

"We did a little thing with the commanders yesterday," he said. "We had them think about, or write down, the name of someone they really admire, and then write one characteristic of that person that they admire. It's interesting that a number of them said, 'It's my father.'"

LTG Van Antwerp spoke of his father as being someone he greatly admired. "Speaking of education and training, we built a number of houses all along the way. My dad's a mechanical engineer, so I'm a mechanical engineer. Because he loved it, I love it. And so it just was a natural. In one of the houses, we put a grease pit in the garage because he loved cars. And the grease pit was cool—it had steps going down to it, and we had a steel plate that was on rollers, so it was easy to roll that back and expose the pit, then you could drive in and never have to jack your car up."

He said that it was in that garage with his dad that he first learned the principle of *quantity* and *quality* time. And one of the considerations he thinks we have today is how to give the right amount of quantity and quality time to the units for which we have responsibility for oversight, but that are not at our own installation. "How do you do that so a captain or a lieutenant doesn't feel abandoned out there?" he asked. "How do you do it when the battalion headquarters is gone and several of the companies are still on the installation? I think we're under stress in that today."

"Here's what I learned from my dad," he said. You never get to the quality time until you give the quantity. I know with my kids, you can say, 'How was your day?' and you won't get the quality. But if you go out and wrestle and you play some football and stuff and then you're all sweaty and you're sitting on the front porch drinking some Gatorade©, you might find out how their day went. But it takes that. So I'm into quantity. And that's why this week, I hope you felt you had the time to actually spend some quantity time and get to that quality."

Van Antwerp said that he drove a 1953 Riley convertible to high school. He explained that for those who didn't know what a Riley is, it's an English car that looks like a big MG. "It was really a cool car," he said, "but it spent a lot of time in our garage because the Riley was no longer being made and parts were hard to find. My dad was a great mechanic, and he was also an inventor. He had a machine shop in our basement, and once when my Riley needed a valve, my dad found one from a GM vehicle, and he redesigned it on a lathe to fit my car. And that was my dad."

He said that in that garage, he learned how to train himself and others, which has come in handy during his 37 years in the Army. At first it was him watching his dad work. And his dad would say, "I need a 3/8-inch wrench—or a 10-millimeter wrench"—or whatever. And whichever tool he asked for would be perfect for that job. "That was an art," Van Antwerp said, "but after spending so much time doing that sort of thing, my dad just knew what he needed. But it was very interesting; at first, I just handed him his tools and watched closely. I learned how he organized things."

> *"The unit has to buy into you before it will buy into where you want to go. So you establish that through your character, your principles—through your being. And then a lot of them will go with you. That's the personnel part."*

"I learned a lot from my dad," he said. "Some of it was from spoken things, but a lot of times it was from just observation. Books will tell you that 90 percent of learning—especially for men—comes through your eyes. And my dad knew that; we would talk some, but a lot of it was just silent movement. As I continued to help him, I wanted to learn to hand that 10 millimeter box wrench to him before he asked for it, so I started to anticipate what he'd need. And then over time, the conversation changed to 'Why don't you go ahead and take that nut off?' or 'You go ahead and put that part back together.' Then eventually it was, 'Hey, Dad. I'm doing this; can I use the garage?' And he would say, 'If you need any help, I'll come out.'"

"That's how I learned to train," Van Antwerp said. "And it was an awesome upbringing that I had. So I bring that to the table. We're all products of our experiences. So the message here today is that your example is enormously important to our Army and what you're doing."

He later spoke of the example that the Regiment leadership is trying to set. "We want to set the example of getting the right people in the right seat. We try and match up your skills, your experiences, your education—but the other thing we're trying to do is match what you want to do to your job. Because we all know that if you're passionate, if we can get you in that place where your passion can come out, that passion just increases your talent, and it also makes it easy for the people you work for. That's what I want. If we get you in, all we have to do is give you the boundaries and keep you from just going off, but we know you will do it."

He said that in this day and age, he thinks we automatically dismiss any kind of individual personnel replacements. "The truth is," he said, "in the Army, the Corps of Engineers, we have 20 or 30 percent of our people going in on individual replacement. So it isn't a pure ARFORGEN; maybe for a brigade combat team (BCT) it is, but not necessarily for us. So there are two types of handoffs going here—you have handoffs of units, and then you have handoffs of people."

Then he asked the group to write three things on the index card that they'd been given earlier:

- Disciplined people
- Disciplined thought
- Disciplined action

Using the framework from the book *Good to Great*[1] by Jim Collins, *disciplined people* refers to having the right people on the bus and in the right seat on the bus. It has the notion of a Level 5 Leader—one with personal humility who has an insatiable will for the organization to go where it needs to go. And he or she sees that picture and is going to take you there—through persuasiveness or influence. "But," he said, "if you get into a unit and you think the first thing you're going to do is put your plan into effect, I suggest to you that there's one thing that has to happen before that: The unit has to buy into you before it will buy into where you want to go. So you establish that through your character, your principles—through your being. And then a lot of them will go with you. That's the personnel part."

Disciplined thought is what you do when you get the right people and they put disciplined thought against your business. "Let me give you a thought on priorities," he said. "The reason I use a timer when I speak is to have a little fun, but the other part of it is that we have to operate efficiently—and within the time we're allotted. And one of the things we cannot create more of is time. A lot of you may wonder—and people often ask me: 'How are you doing it? How do you manage your time?'"

"Well," he said, "I'll give you a little insight into how I do it. I believe very much in a simple principle called the Pareto Principle—a 20-80 principle. For a long time I've thought about how to get this done when you go into a new job. And how do you do it so that you are getting the max out of your time? Well, here's what the principle says: If you have a picnic, 20 percent of the people you invite will eat 80 percent of the food. Here's what it means in your priorities: the top 20 percent of your priorities will produce about 80 percent of the productive results. I would also suggest that 20 percent of your time yields about 80 percent of the results—those really focused efforts."

Van Antwerp said that an interesting thing is that if you're a lion trainer and you go into a lion cage, you take two things— a whip and a chair. Normally, between the whip and the chair you're going to get the lion to sit down. The chair has four legs on it. Since a lion or a wild animal is used to attacking a single thing, when you put that chair in the face of the lion, it paralyzes the lion. "What is it about the chair that paralyzes the lion? Well, it's those four legs coming at it, all at the same rate. And the lion can't figure out which leg is the most important. It's all about focus."

"If we aren't careful, we can do the same thing to our people. We can give them so many things that they're all coming at them, and if we don't say, 'That leg up there—that is the important leg,' they won't know what to do first. But I have plenty of time to do what I do. My saying is that I have plenty of time to do what God needs me to do; I don't have all the time to do what I want to do, but you have to have some focus on this. So that's what we have to be about."

In the *disciplined people* part of their card, he asked the group to write their advice to him or the Engineer School commandant on something they should take up that has to do with the people part of this. "I know we have some groups that are doing the *Building Great Engineers* thing, and it's going to be a great day tomorrow as we look at that," he said. "But if you think we have a real problem with putting our arms around our engineers who are in other locations where we don't have the lieutenant colonels and the colonels, then let me know."

Van Antwerp said that he also wanted the attendees to put on their card what they think the Regiment should be putting *disciplined thought* into today. "It may be something that you know we're already taking on, and you just write that down and put an exclamation point—that's where you ought to be going," he said. "But if you're thinking about something that you haven't heard here—and you think the Regiment needs to be thinking about it—then write that on your card. I talk a lot about Wayne Gretzky and hockey because I love it, but when Gretzky was asked 'What's your secret?' he said, 'I skate to where the puck is going to be.' That's the disciplined thought part for leaders—Where is the puck going to be?—so help us out on that one."

"Finally," he said, "if you think we're at the point where we should be putting *disciplined action* into something we're not putting it into today—something that we're still talking about and you want to say, 'I wish we'd stop talking about this and just do it'—then put a 'Just do it!' on the bottom of the card."

Van Antwerp reemphasized with attendees his "Big Four" for great organizations. He said that some of these apply directly to their organization, and some apply more to the Corps of Engineers. "But there's one thing you have to do for people if you're going to take them somewhere—you have to create a picture of what it looks like there. Here's my picture for the Corps of Engineers":

You have to deliver a superior performance every time. He said that that's what we're ultimately paying for. "We have that in our creed," he said: 'I'll always place the mission first.' You have to deliver. When that BCT commander turns to you and asks, 'Engineer, where can we put a forward operating base so we can have running water and some security? Tell me what I need—barriers, T-walls, all that.' You don't want to walk backward and give them the impression you don't know what you're doing there, so how do we make sure that we have the right people there and that we can deliver? We *have* to deliver. Those of us who have experienced Katrina know that we're only as good as our last project."

You'll set the standard for your profession. He said that if you're in real estate, get a real estate license; if you're a program or project manager, get a program management professional (PMP) certification; if you're an engineer or an architect, get your professional engineer (PE) certification. "Let's crank it up professionally, and then when you deal with our contractors and other partners, you're dealing at the same level."

Where you (as a unit) and you alone can make that unique contribution to this nation or other nations, you need to do that. He said that in the Corps of Engineers, one of those unique things is about water. "We know a lot about water. We're very developed, compared to Africa or other places, on reservoirs and how to deliver hydropower. Another thing, something that only we could do, was build a fence along the southern border of this country. Why? Because they needed our regulatory expertise, and they needed our real estate. And we have many other projects."

You have to make sure your unit is built to last. Jim Collins wrote *Built to Last*[2] before he wrote *Good to Great*; that is one of our marks. For the Corps of Engineers, what does that mean today? "Having the right people right-seated on the bus," he said, "and we need 3,300 more of them than we have. We know what we need to do to get the job done. And what we don't want to do is hire temporary workers to do that; we want to hire Department of the Army civilians so when we come through this, we're going to look back and say we built this to last. So, those are our markers."

"I so appreciate all of you," he said. "It's an honor and a privilege to be a part of this. I wake up every day and express in my heart what a privilege it is that I get to do this—for whatever time they'll leave me here. And I hope it's forever."

"God bless you all; keep up the great work."

Ms. Bridges, managing editor of the Engineer Professional Bulletin, has been a member of the bulletin staff for the past 14 years. She holds a bachelor's from Missouri State University, Springfield, Missouri.

Endnotes

[1] *Good to Great* by Jim C. Collins, Harper Business: New York, 2001.

[2] *Built to Last* by Jim C. Collins and Jerry I. Porras, Harper Business: New York, 1994, 1997.

BUILDING AGILE AND ADAPTIVE LEADERS

By Lieutenant General William B. Caldwell, IV

Note: This article is adapted from a speech given on 23 April 2009 to attendees of ENFORCE 2009 at Fort Leonard Wood, Missouri.

Engineer history is inundated with success stories of agile and adaptive leaders contributing to our nation's progress. You are the organization that gave us the United States Military Academy, the Washington Monument, the Panama Canal, and the Pentagon, and you are in greater demand today than ever before.

The United States Army Corps of Engineers is at work in more than 90 countries, supporting 159 Army installations and 91 Air Force installations and operating 609 dams and 257 navigation lock chambers at hundreds of sites. You operate 24 percent of America's hydropower capacity. Engineers are serving as architects, ecologists, geologists, park rangers, accountants, cartographers, chemists and, most notably, as warriors.

Since 11 September 2001, approximately 70 percent of our engineer force—that's including the newest engineers that haven't even had an opportunity to deploy—have served our nation in a hostile area at least once. More than 30 percent have deployed multiple times. And it's more than just deployments…the unique, but critical, aspect of engineer life is the important and complex missions you perform daily all over the world and many in the continental United States. From the mountains of Afghanistan to the Red River in North Dakota, Army engineers are the most diverse group of selfless servants in our Army today.

Engineer versatility is illustrated in the accomplishments of the *Building Great Engineers* campaign that includes improvements in working with accessions, improvements in the classroom, and efforts to align assignments with training and education. Engineers are "clearing the route" and "marking the lane" for all of us to move forward and meet the challenges of the 21st century—a century that is marked by the rising threat of a violent extremist movement that seeks to create anarchy and instability throughout the international system. Within this system, we also face emerging nations that are discontented with the status quo and seeking a new global balance of power. As our nation continues into this era of uncertainty and persistent conflict, the lines separating war and peace, enemy and friend, have blurred and no

> ***"Engineers are 'clearing the route' and 'marking the lane' for all of us to move forward and meet the challenges of the 21st century…."***

longer conform to the clear delineations we once knew.

Understanding how to operate in this complex and ever-changing environment of the 21st century is critical to the development of our leaders. This environment will require leveraging every element of our national power and includes cooperating and collaborating with nongovernmental and international organizations. As our President said during his recent announcement of a comprehensive Afghanistan strategy, "A campaign against extremism will not succeed with bullets or bombs alone…to achieve our goals we need a stronger, smarter, and comprehensive strategy." This means that our Army has a requirement to develop leaders capable of operating effectively within this comprehensive approach.

Our country needs agile and adaptive leaders to lead us in this changing world—the 21st century (see Figure 1). The Chief of Staff of our Army has used the analogy that our force must resemble a middleweight fighter. We must be a lean, agile, and rapidly adaptive force with the endurance and knockout power to take on and defeat any opponent, regardless of weight class. By carefully studying his adversaries and with modification to the fighter's training and diet, the middleweight can easily move between weight classes and defeat any opponent. Just as with that middleweight fighter, our Army needs to be equally versatile, equally decisive, and equally lethal.

Building Agile and Adaptive Leaders

- **Agile and adaptive leaders**
  - **Middleweight fighters**
  - **Mental agility – flexibility of mind, a tendency to anticipate or adapt to uncertain or changing situations, staying ahead of changing environments**
  - **Ability to meet the challenges of the 21st century and full spectrum operations in an era of persistent conflict**
- **Leaders that are:**
  - **Critical and creative thinkers**
  - **Competent and confident communicators**
  - **Capable of operating with a comprehensive approach**

Figure 1

Critical and Creative Thinkers

- **Problem solvers who understand that answers are situationally dependent, not memorized from doctrine.**
- **Leaders with the critical and creative thinking skills to introduce new solutions to complex and dynamic problems.**
- **Thinkers who challenge assumptions and anticipate 2d and 3d order effects…ask "Why?"**
- **Leaders whose education focuses on how to think vs. what to think. "Break the mold" thinking – 21st century problems cannot be solved by 20th century thinking.**

Figure 2

We must understand that military force—although necessary—is not sufficient; it does not win the peace. Probably no one understands that better than you! Engineers are lethal warriors and nation builders. You have always operated across the full spectrum of conflict; you embody better than anyone else our nation's destructive and constructive capabilities. As engineers, being agile and adaptive is already in your DNA; you get it…and it could not be more clearly illustrated than in the 4th Engineer Battalion when they just received a change of mission from Iraq to Afghanistan—after operating in Baghdad for only two weeks.

We need agile and adaptive leaders who are broad enough to handle the challenges of full spectrum operations in this era of persistent conflict. These agile and adaptive leaders must be *critical and creative thinkers*, they must be *competent and confident communicators*, and they must be *capable of operating with a comprehensive approach* to meet these emerging challenges. These critical attributes will enable our leaders to contend with offensive, defensive, and stability operations simultaneously…leaders who can integrate combined arms, integrate with host nation forces, and be perceptive enough to discern changes in the operational environment in order to anticipate transitions.

What do we mean by critical and creative thinkers, and how does that translate to leader development (see Figure 2)? Well, some people will tell you the glass is half full, and others will say it is half empty. But the engineer will tell you the glass is twice the size it needs to be. This is the kind of out-of-the-box thinking we need—critical and creative thinkers who are courageous enough

Competent and Confident Communicators

- Embrace a culture of engagement...develop confidence and connect with those we serve
- Cyber Savvy – capable of communicating in the information domain of the 21st century and looking at media space as maneuver space
- Strategic Communications (STRATCOM) – leader-driven as a process, not a product
- Culturally Astute – responsive to cultural issues and able to establish trust and confidence in the countries and cultures in which we operate

Figure 3

Capable of a Comprehensive Approach

- "We have learned that in the 21st century, we must use all elements of American power to achieve our objectives..." – President Obama, 27 February 2009
- Leaders must cooperate, coordinate, and collaborate across multiple agencies, both within and outside the U.S. government.
- This approach has been applied in writing doctrine, in education, and in training (FM 3-07, interagency participation at Command and General Staff College, provincial reconstruction teams at training centers)

Figure 4

to see and exploit opportunities in the challenges and complexities of the 21st century.

What good are critical and creative thinkers if they cannot communicate their ideas? Our leaders must be competent and confident communicators (see Figure 3). Competence, we know, builds confidence, which leads to capable communication. We must strengthen our leaders' ability to communicate in a wide variety of information mediums. So how do we develop competent and confident communicators?

Knowing that we will always operate in a joint, interagency, intergovernmental, and multinational (JIIM) environment makes this communication even more important. We must recognize that our leaders will not only be required to communicate across foreign cultures but also must know and understand how other organizations operate (such as the Iraqi army, Department of State, nongovernmental organizations, private voluntary organizations, businesses, and academia). Our leaders must be capable of operating with a comprehensive approach (see Figure 4). Leaders must cooperate, coordinate, and collaborate across multiple agencies from both within and outside the U.S. government. Our leaders must be able to unite diverse groups of people and work toward a shared goal. Agile and adaptive leaders are comfortable in the complex and ambiguous environments we already face today and are going to be the combat multiplier we need in the 21st century. Engineers consistently work in these complex environments, operating with Air Force REDHORSE squadrons, Navy Seabee units, the National Geospatial Agency, the Joint Improvised Explosive Device Defeat Organization (JIEDDO), and other foreign engineer forces and civilian agencies to accomplish missions in Iraq, Afghanistan, and around the globe.

We've discussed how to develop agile and adaptive leaders and the kinds of attributes those leaders must possess to succeed in the 21st century, but what about facilitating this lifelong development in units and organizations around the Army? What about encouraging and empowering these agile and adaptive leaders? That is a real challenge of ours. To do so, we must be courageous in our approach (see Figure 5, page 11).

We build all these leader skills through education, training, and experience. We must be mindful as we move forward that we don't make the mistake of substituting experience for education. Experience is critical, as long as it is the right experience; and our training is outstanding, as long as it is the right training. But what prepares leaders to make decisions in a complex uncertain environment is the combination of education, experience, and training. The combination of all three is what gives us our greatest versatility.

Our Army Values and the Warrior Ethos will remain the underpinning of our educational and training efforts as they prescribe conditions that facilitate trust, interdependence, and cohesion among Soldiers. They also set the standard for how our Army will interact with individuals outside of the Army. All this must be grounded in our Army Values and the Warrior Ethos—the same Army Values and Warrior Ethos epitomized by approximately 1,800 engineers that have received valorous awards for their actions in Iraq and Afghanistan. Examples of this courageous action include the following:

- Billy Zar, the captain of a debris-removal tug boat operating in Texas, reacted instinctively when his team saw a 500-gallon fuel tank floating in dangerously high water in the Industrial Canal during Hurricane Gustav. They knew that if the tank were to hit the flood wall or other important structures, there could be grave consequences. So, without hesitation, Billy courageously jumped into the water and corralled the 500-gallon tank, possibly saving countless lives and protecting property. For his actions, he was recognized by Lieutenant General Robert B. Van Antwerp, Chief of Engineers.
- Staff Sergeant Lincoln Dockery, who charged an enemy position to fight through an enemy ambush in Afghanistan. During the charge, Dockery was injured, but he kept going despite intense enemy fire that included hand grenades and incoming rocket-propelled grenades. After pushing the enemy back from their position, close air support was called and reported that there were more than 30 enemy fighters. For his actions, he was awarded the Silver Star.
- Sergeant First Class Paul Smith's courageous actions to defeat an enemy attack at the Baghdad International Airport resulted in as many as 50 enemy soldiers killed, while allowing the safe withdrawal of numerous wounded Soldiers. For his actions, he was awarded the Medal of Honor.

Our Soldiers are blessed with these types of leaders... courageous, selfless, serving leaders. We owe it to our nation to develop leaders of character and value...leaders who have the mental agility to anticipate and adapt to uncertain or changing situations...leaders who can integrate the tools of statecraft with our military forces, international partners, humanitarian organizations, and the private sector... leaders who can forge unity of effort among a very rich and diverse group of actors to shape a better future . . . a better tomorrow. And those leaders are sitting in this auditorium today. Each and every one of you bears this mantle of leadership. You are our most versatile force, and for more than 200 years our nation has called on you to be the most agile and adaptive element in our Army...and we will continue to do so in the 21st century.

Thank you for inviting me to be a part of ENFORCE 2009.

Lieutenant General Caldwell is the Commanding General, United States Army Combined Arms Center and Fort Leavenworth, and the Commandant, United States Army Command and General Staff College, Fort Leavenworth, Kansas.

Encouraging Leader Development

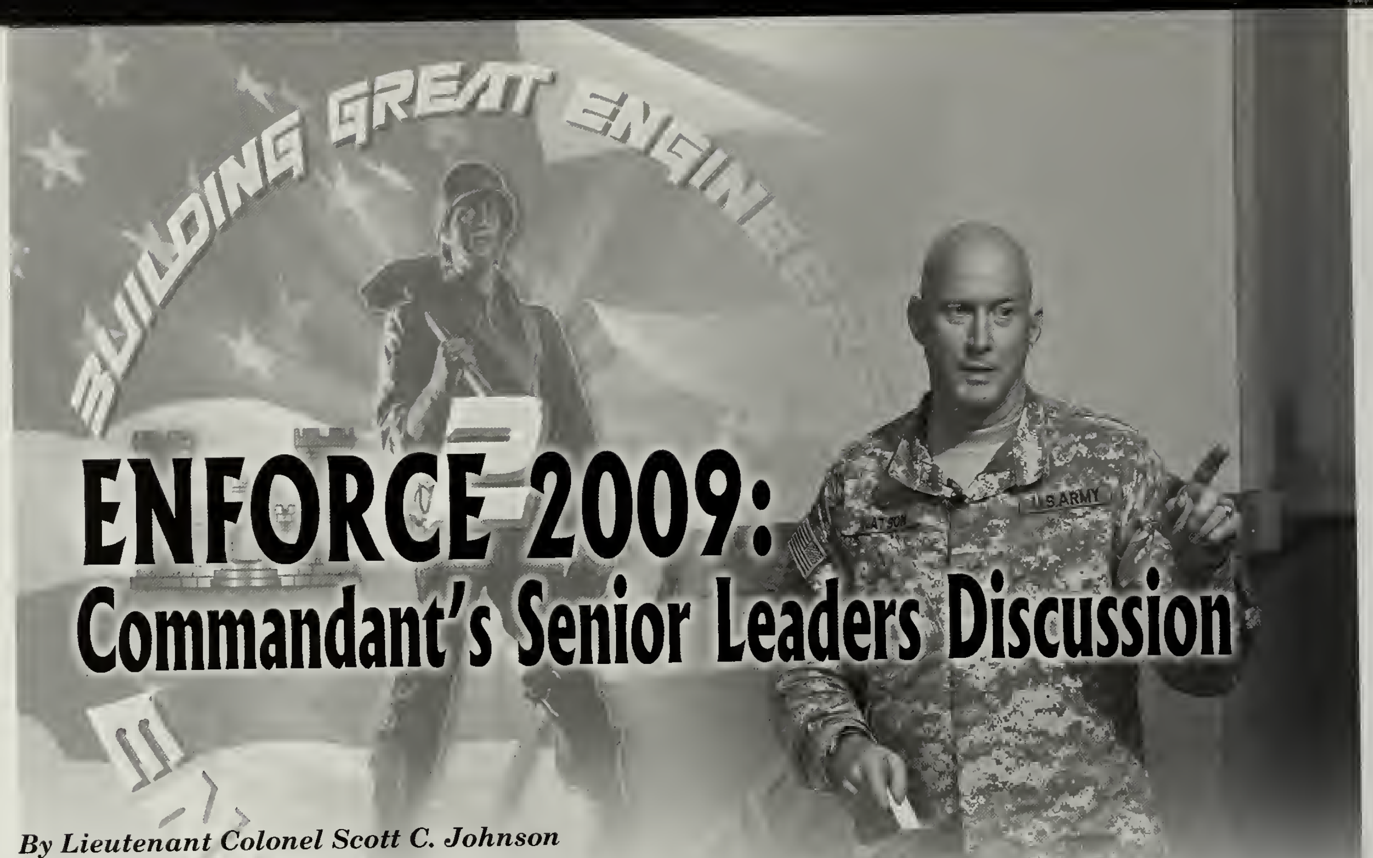
- **C**lear focus/priorities
- **O**ne – make leader development your number one priority
- **U**nderwrite honest mistakes
- **R**esist the tendency to centralize
- **A**ccept personal risk – be the heat shield for your subordinates
- **G**ive missions – leave the "how" to the individual
- **E**ncourage open communications in all directions

Figure 5

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*, or were inadvertently omitted from a previous list. We dedicate this issue to them.

George, Major Jason E.	252d Combined Arms Battalion, 30th Heavy Brigade Combat Team	Fayetteville, North Carolina
Keesling, Specialist Chancellor A.	961st Engineer Company, 844th Engineer Battalion	Sharonville, Ohio
Johnson, Jr., Specialist Isaac L.	Alpha Company, 48th Brigade Special Troops Battalion	Statesboro, Georgia
Wallace, Sergeant Daniel W.	Charlie Company, 201st Engineer Battalion	Cynthiana, Kentucky
Williams, First Lieutenant Derwin I.	Troop B, 2d Battalion, 106th Cavalry Regiment	Dixon, Illinois



ENFORCE 2009: Commandant's Senior Leaders Discussion

By Lieutenant Colonel Scott C. Johnson

Then Colonel Bryan G. Watson, United States Army Engineer School Commandant, addressed the ENFORCE 2009 attendees midweek of the conference, with the purpose of opening a dialogue within the Regiment concerning its future and direction. Embedded in the discussion were his initial assessment and thoughts on the purpose and unique aspects of the Regiment and objectives and key initiatives that support and improve the Regiment's mission. The following is a summary of that discussion. You can see a video of the entire presentation at the Engineer School Knowledge Network (ESKN) at <https://www.us.army.mil/suite/page/126> .

Through this article, other ENFORCE articles in the *Engineer Professional Bulletin*, and recent and future engagements with senior leaders within the Regiment, the goal is to expand the discussion, validate the content, and get your input. Additionally, this summary will increase your situational awareness with regard to the issues facing the Regiment and the commandant's priorities. As always, your voice is important in this refinement process, and we welcome your comments.

Summary

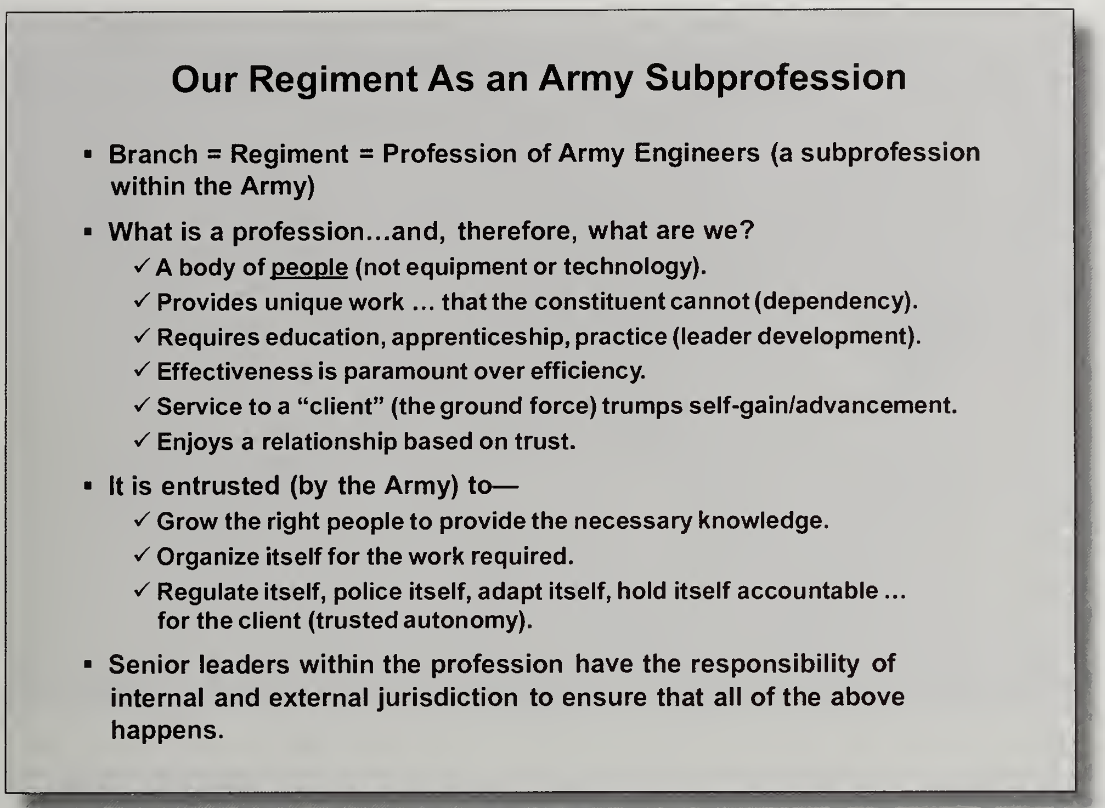
The discussion began with the Commandant's thoughts on the Engineer Regiment and its place in the United States Army.

The Engineer Regiment is a subprofession of the larger profession of arms (see Figure 1, page 13). It is a body of people—not just equipment, organizations, or technology—with a passion or calling to serve as Warriors with technical skills. These technical skills set the Engineer Regiment apart via its unique services and knowledge that the Army needs to accomplish its missions. To prepare our Soldiers and civilians to accomplish their missions in support of the Army, the Regiment requires special education, apprenticeships, and practice.

As with any endeavor in the Army, there is a constant tension between being effective and trying to garner efficiencies. For the Engineer Regiment, effectiveness is paramount and must trump efficiency. Likewise, service to the Army (our client) trumps self-gain and advancement of the Regiment. In other words, a decision that negatively impacts the Regiment in terms of personnel, equipment, material, or other measurable element is the right decision if the overall benefit to the Army is positive. This isn't to say that the Engineer Regiment is stepping up to be a bill payer. To the contrary, it simply means that the Engineer Regiment cannot be seen as being parochial in all decisions and actions.

With this type of attitude and approach, the Engineer Regiment will continue to enjoy a special relationship of trust within the Army. In turn, this will allow the Regiment to assess, train, and develop the right people; organize itself to best serve the Army; and hold itself accountable for its successes and failures. This accountability includes the need to regulate and police itself and its personnel via evaluations and administrative actions given and taken by our senior leaders.

A key aspect of the Engineer Regiment's success is its adaptability. The ongoing modification and changes to the modular engineer force that are occurring due to feedback from operations, and the leader development *Building Great Engineers* initiatives are prime examples of our institutional adaptability. Working hand in hand with the United States



Our Regiment As an Army Subprofession

- **Branch = Regiment = Profession of Army Engineers (a subprofession within the Army)**
- **What is a profession...and, therefore, what are we?**
  - ✓ **A body of people (not equipment or technology).**
  - ✓ **Provides unique work ... that the constituent cannot (dependency).**
  - ✓ **Requires education, apprenticeship, practice (leader development).**
  - ✓ **Effectiveness is paramount over efficiency.**
  - ✓ **Service to a "client" (the ground force) trumps self-gain/advancement.**
  - ✓ **Enjoys a relationship based on trust.**
- **It is entrusted (by the Army) to—**
  - ✓ **Grow the right people to provide the necessary knowledge.**
  - ✓ **Organize itself for the work required.**
  - ✓ **Regulate itself, police itself, adapt itself, hold itself accountable ... for the client (trusted autonomy).**
- **Senior leaders within the profession have the responsibility of internal and external jurisdiction to ensure that all of the above happens.**

Figure 1

Army Maneuver Support Center (MANSCEN), the United States Army Training and Doctrine Command (TRADOC), and the Department of the Army, the Engineer Regiment is continuing to look for innovative ways to increase its effectiveness while working within the left and right limits imposed by higher headquarters due to resource constraints on the Army (that's the tension between effectiveness and efficiency discussed earlier).

Commandant's Campaign Plan Framework – The Purpose of the Profession of Army Engineers

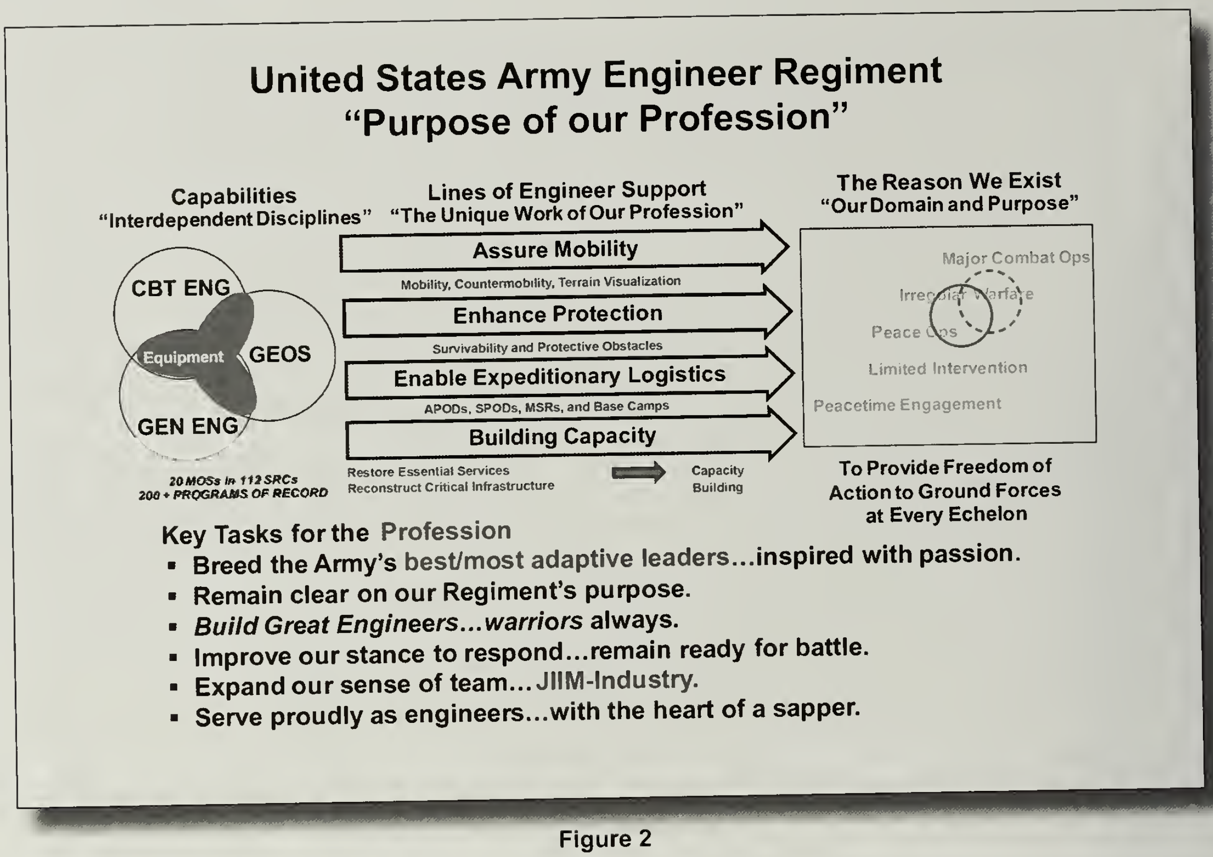
It is important for everyone to understand the Engineer Regiment's purpose and its role in the overall military profession within the United States Army (see Figure 2, page 14). First and foremost, engineers bring three unique capabilities that support the overall effort of the Army during operations and drive training requirements during peacetime: combat engineering, geospatial engineering, and general engineering.

These unique capabilities are brought to bear along three to four major lines of engineer support that provide warfighters from platoon leader to combatant commanders with the ability to successfully execute missions and operations. Engineers assure mobility, enhance protection, and enable expeditionary logistics; a new emerging line of engineer support is building capacity.

There is a debate concerning whether building capacity is a line of engineer support or just a role engineers can assume based on the mission and their inherent adaptability, core technical training, and historical affinity to step up and "Let Us Try." Since ENFORCE, we have taken the approach that elements of building capacity should be a line of engineer support. However, there are still major implications that have to be studied to ensure that changes to our doctrine, organizations, training, material, leader development, and all the rest are identified, recognized, funded, and institutionalized to support the Army.

The Engineer Regiment's unique capabilities, combined with its lines of engineer support (current and future), define the reason we exist. Specifically, its combat, geospatial, and general engineering capabilities brought to bear along the lines of engineer support ensure that maneuver commanders have freedom of action and the ability to operate across the full spectrum of conflict, to include peacetime engagement. As a Regiment, we must ensure that our capabilities continue to meet the demands of both our doctrinal missions and the emerging requirements generated during our operational employments.

The commandant noted several key tasks that engineers must do to ensure that the profession is positioned for success. First and foremost, we must—as a Regiment—breed the Army's best and most adaptable leaders inspired with the passion to excel in generating capabilities and employing engineer forces along the lines of engineer support to ensure overall mission success. To do this, we must be and remain clear on the Regiment's purpose and role within the Army.



United States Army Engineer Regiment
"Purpose of our Profession"

Capabilities
"Interdependent Disciplines"

20 MOSs in 112 SRCs
200 + PROGRAMS OF RECORD

Lines of Engineer Support
"The Unique Work of Our Profession"

Assure Mobility
Mobility, Countermobility, Terrain Visualization

Enhance Protection
Survivability and Protective Obstacles

Enable Expeditionary Logistics
APODs, SPODs, MSRs, and Base Camps

Building Capacity
Restore Essential Services
Reconstruct Critical Infrastructure
Capacity Building

The Reason We Exist
"Our Domain and Purpose"

To Provide Freedom of Action to Ground Forces at Every Echelon

Key Tasks for the Profession

- **Breed the Army's best/most adaptive leaders...inspired with passion.**
- **Remain clear on our Regiment's purpose.**
- ***Build Great Engineers...warriors* always.**
- **Improve our stance to respond...remain ready for battle.**
- **Expand our sense of team... JIIM-Industry.**
- **Serve proudly as engineers...with the heart of a sapper.**

Figure 2

Furthermore, our leaders must be the military engineering subject matter experts. At the same time, as members of the greater military profession, engineer leaders must be warriors who can walk the walk and talk the talk to ensure that engineer units fully support our maneuver brethren. Our leaders must be inspired by our purpose as an Engineer Regiment and inspire their fellow sappers to serve proudly as engineer warriors.

Additionally, engineer units must be trained and equipped to execute their unique missions as engineers and be able to adapt to perform other missions that the operational situation demands. Modularization and modernization must continue to ensure that engineers remain ready for battle and are continuing to improve their stance to respond to their nation's call.

Along the same lines, engineer leaders and planners must reach out to other Services, agencies, and nations to access the right resources (such as capability, knowledge, and capacity) at the right time to accomplish the mission. At times, the right organization to execute a particular mission may be an industry partner. Our leaders expand our sense of team to include our joint, interagency, intergovernmental, and multinational (JIIM) partners and industry experts.

It is essential that engineer leaders know and understand how to quickly and effectively tap into these JIIM and industry resources and use them to enhance mission success. Not only is it imperative that we train and work with our partners during predeployment and mission preparation exercises, but engineer leaders must also be trained and educated on how to bring our JIIM and industry partners to bear on the challenges of the future.

Commandant's Vision – Initial Components

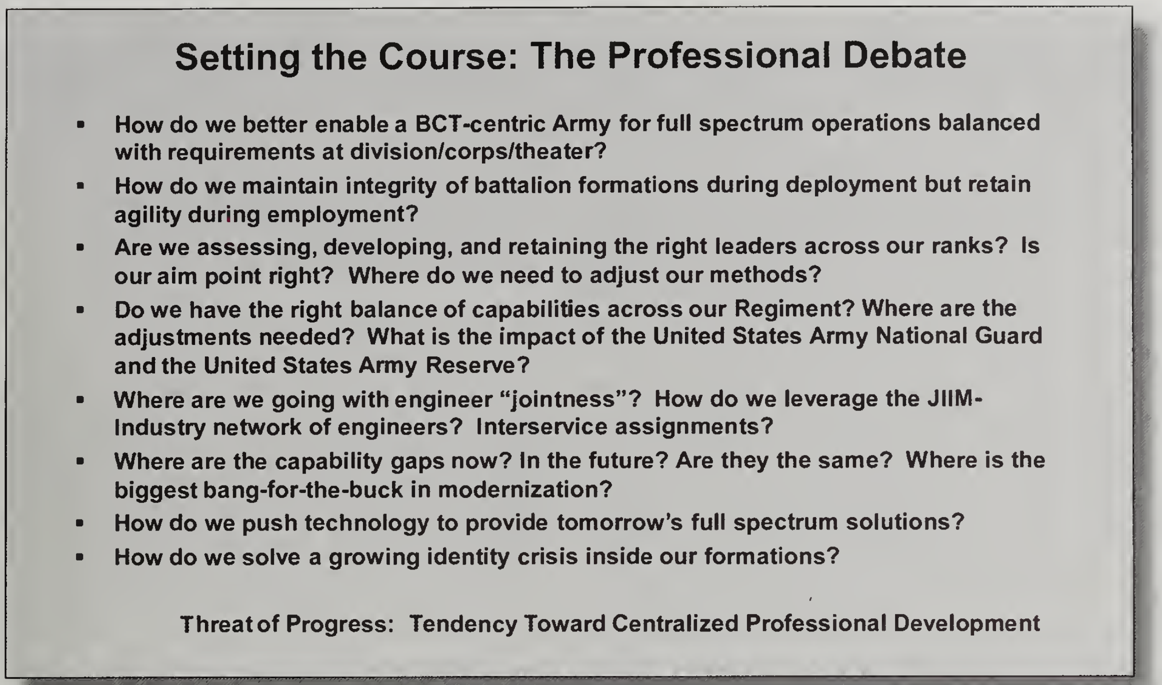
"Engineer warriors leading to serve ground forces: A Regiment inspired to answer the commander's call"

Regimental Family of Families. The Engineer Regiment is a family composed of both military Servicemembers and civilian employees—the Regiment cannot afford to ignore one or the other group. Likewise, the families of our sappers and civilians are part of our regimental family. Engineer leaders must be cognizant of the impact their decisions have on our families and the impact our families have on our sappers' service.

World's Best Military Engineers. The Engineer Regiment must establish itself as the world's best military engineers.

Warriors Always. Sappers must be warriors in their own right while being the experts in bringing military engineering capabilities (combat, geospatial, and general engineering) to bear.

Leading to Serve Ground Forces. Tied back to our purpose and the unique calling of the subprofession of military engineers, the Engineer Regiment is a regiment of service. We execute our missions to enable the Army to execute its mission. We are leaders who are dedicated to service.



Setting the Course: The Professional Debate

- How do we better enable a BCT-centric Army for full spectrum operations balanced with requirements at division/corps/theater?
- How do we maintain integrity of battalion formations during deployment but retain agility during employment?
- Are we assessing, developing, and retaining the right leaders across our ranks? Is our aim point right? Where do we need to adjust our methods?
- Do we have the right balance of capabilities across our Regiment? Where are the adjustments needed? What is the impact of the United States Army National Guard and the United States Army Reserve?
- Where are we going with engineer "jointness"? How do we leverage the JIIM-Industry network of engineers? Interservice assignments?
- Where are the capability gaps now? In the future? Are they the same? Where is the biggest bang-for-the-buck in modernization?
- How do we push technology to provide tomorrow's full spectrum solutions?
- How do we solve a growing identity crisis inside our formations?

Threat of Progress: Tendency Toward Centralized Professional Development

Figure 3

Answering the Commander's Call. As always, the Engineer Regiment has a history of taking on seemingly impossible missions and executing them beyond expectation. This standard of excellence sets us apart as an invaluable member of the Army team.

The Most Flexible and Adaptive Units. Engineer units also have a history of assuming new roles and missions as they arise during combat operations. This is a direct reflection of the trust Army leaders have in the ability of engineer units to adapt to changing requirements and the flexibility of our leaders. The legacy of flexible and adaptive units must continue.

Soldiers and Civilians That Inspire Each Other. A key characteristic of the Engineer Regiment is the trust and confidence its civilian and military leaders have in each other. The inspiration gained via the mutual respect of skills and competencies generates an enormous amount of synergy when solving complex problems and is a key trait of the Regiment.

Soldiers Who Dare to Demand "Let Us Try." From junior Soldier to senior leader, the Engineer Regiment is known for its continual drive to achieve the impossible. When others have tried with limited success, engineers have routinely stepped up and achieved success. No matter how difficult, no matter how dangerous, no matter how complex and daunting, engineers past and present step into the breach and clear the way.

Setting the Course – The Professional Debate

In the near term, the commandant identified several key issues to focus the Engineer Regiment on resolving many of the issues it is currently facing. While there are many issues, the eight listed in Figure 3 are currently at the top of the list and have broad and far-reaching impacts. It is critical that we as a Regiment keep the dialogue and discussion open and professional to ensure that we identify issues that will impact the Engineer Regiment in the future.

The Engineer School and Regiment as a whole are working many of these issues now. The brigade combat team engineer battalion, *Building Great Engineers*, total army analysis processes, engineer coach and career advisor, future combat system developments, and JIIM and industry partnership developments are all ongoing initiatives that will address our issues.

The commandant is prepared to expand the debate and address issues across the Engineer Regiment. Your thoughts, ideas, and proposals are essential to this process. Keep the cards and letters coming.

Perhaps more important, it is essential that we as a collective professional organization embrace our heritage, our purpose, and our reason for being. If we all internalize the concept of unselfish service with a heart of a sapper, it will be a simple thing to inspire our junior sappers to step up and say, "Let Us Try." Developing and promoting this attitude within and across the Engineer Regiment can and will make a difference.

Lieutenant Colonel Johnson is the United States Army Engineer School Chief of Staff. He commanded the 1-3 Brigade Special Troops Battalion, 1st Brigade Combat Team, 3d Infantry Division, from 20 June 2006 to 17 June 2008.He holds a master's in administration from Central Michigan University and a master's in military arts and sciences from the School of Advanced Military Science.

Army Professional Engineer Continuing Education

By Dr. Troy L. Messer, Major Stephen M. Bert, Major Jason A. Evers, and Major Richard J. Gash

There are several reasons why the United States Army should develop its own program for continuing education instead of using one of the many commercial classes available. The *Building Great Engineers* campaign of the United States Army Engineer School has highlighted the opportunity and value of developing professional credentials, specifically the professional engineer (PE) license. Also, more states are adding continuing education requirements in order to sustain licensure. Army officers have special technical skill requirements as well as unique difficulties in sustaining professional development while deployed. Commercial courses are not developed to address specific Army-related issues. Additionally, commercial courses require units to commit funds or effectively place undue financial hardship on Soldiers to maintain proficiency for the Army's benefit. This supports the need for an Army combat engineer credential that parallels the emergency manager credential in the Federal Emergency Management Agency.

Today the Army is striving to conduct the full spectrum of operations. Engineers provide a tremendous resource for certain aspects of stability operations. PEs in particular could leverage their technical expertise along with their tactical proximity to the operations, in effect becoming a force multiplier. To increase the effectiveness of military engineers, it would be a wise investment to provide them with a professional education program that sustains technical knowledge and provides the most up-to-date training necessary to conduct reconstruction in stability operations. The Engineer Branch has a dual need to satisfy the combat engineer sapper.

Background

The Engineer School has produced more than 970 master's degree students—through University of Missouri–Rolla (now Missouri University of Science and Technology) programs in engineering management, civil engineering, and geological engineering—to build its technical competency base in support of the brigade combat team (BCT).

The Army is now, and will be for the foreseeable future, formed around the modular BCT. Therefore, decentralized execution of stability operations is inherent in today's operating environment. Brigades need access to trained PEs. It may be in the form of an engineer coordinator or an attached field engineering support team, but engineering expertise should be an integral part of the BCT staff. Field Manual (FM) 3-07, *Stability Operations and Support Operations*, provides a framework for conducting stability operations. From that FM, the authors have developed a construct for professional engineering support to stability operations. FM 3-07 outlines the following three intervention phases of stability operations:

- Initial response
- Transformation
- Fostering sustainability

Initial Response

One of the fundamentals of successful stability operations is to quickly create positive and lasting change in the environment. It is from this fundamental that the holy grail—security—is most effectively enabled. During the initial response phase, military forces will be focused on providing food, water, shelter, and medical support to the host nation. While engineers will have a crucial role in planning for, and providing support for, the initial response, it is in preparing for the subsequent phases that they have the greatest capacity to positively affect stability operations.

Transformation

The trained PE will be able to facilitate effective and rapid transition through the phases. As stability operations move from initial response to transformation, a trained engineer will be able to rapidly effect local reconstruction. This will be achieved by conducting early and effective engineer reconnaissance of reconstruction sectors such as transportation, energy, communications, hazardous waste remediation, water/wastewater, and sanitation. The expertise provided by a PE will facilitate better estimates and enable a more efficient distribution of resources during the transformation phase. Also, construction management proficiency will enable effective construction management at various echelons of the deployed force. This will also create a second-order benefit to overworked contract officers, who have neither the time nor technical expertise to properly oversee the myriad of smaller reconstruction projects in the area of operations.

Fostering Sustainability

One of the challenges of conducting effective reconstruction projects is ensuring the sustainability of the projects after stability forces depart. Army engineers are unique in their combination of cultural understanding, experience operating in degraded or Third World environments, technical education, and (with help from the proposed continuing education program) their awareness of state-of-the-art engineering solutions. This combination of experience and education will enable engineers from BCT to theater level to develop solutions that will be sustainable within the host nation's probable educational, economic, and infrastructure capabilities.

State Requirements

The authors investigated the continuing education requirements for two states. The first was Missouri, due to the fact that a large number of engineer officers acquire their PE license there. The second state, Montana, was chosen at random. Both states currently have some sort of exemption for licensees serving on full-time active military duty. While Missouri offers a permanent exemption, Montana only exempts those on temporary active duty (United States Army National Guard and United States Army Reserve Soldiers), which seems to indicate that active duty personnel are still required to complete continuing education. Both states require 30 professional development hours in a two-year rolling renewal period. An hour is defined as "one contact hour of instruction or presentation" which should be relevant to the practice of engineering and can include technical, ethical, or managerial topics. Qualifying activities attended in another state are allowed by both states. Missouri allows engineer-related satellite downlink video and computer software courses to complete the requirement. Montana takes a stricter approach, maintaining that "it is not intended that these courses be taken in private, such as a videotaped program in one's home, but rather be conducted in a group setting." However, the Montana guidelines also state that "a qualifying correspondence course should require the participant to show evidence of achievement and completion, and include a final, graded test." Both states require the maintenance of certificates to document individual training sessions and a logbook containing a summary of the entire reporting period.

Educational System

Engineer School Knowledge Network

The Engineer School Knowledge Network (ESKN) module on the Army Knowledge Online (AKO) site maintained by the Engineer School provides an ideal platform for a professional continuing education program. The portal is available to anyone with AKO login credentials. It can be accessed easily from the Engineer School webpage via an unsecured Internet connection. Use of ESKN would reduce the technical overhead required for the program by leveraging AKO's existing security, server, and graphical user interface capabilities. A content manager with ESKN administrator privileges could maintain the technical aspects of the program with little effort. Furthermore, the Engineer School's Blackboard™ suite, which has successfully supported both Regular Army and Reserve Component distributed learning (dL), is well-qualified to be a successful delivery platform as another course of action.

Course Topics

Courses studied should be based on doctrine and updated to maintain currency with the state of the art in military engineering. Some examples of classes could include:

- Providing food and water
    - Finding subsurface water
    - Analyzing water treatment plants
    - Constructing wells
    - Designing irrigation systems
- Providing shelter and medical support
- Learning structural design
    - Designing wood structures
    - Designing masonry structures
- Conducting construction reconnaissance
    - Identifying critical systems nodes
    - Constructing environmental baseline assessments
- Writing a statement of work
    - Assessing requirements
    - Estimating material, manpower, and equipment costs
- Understanding nongovernmental organization (NGO) and other government agency (OGA) support to reconstruction
    - Understanding the United States Agency for International Development (USAID) organization and capabilities
- Learning fundamentals of construction management in order to oversee contract execution
- Communicating news of reconstruction progress—good and bad—to the public
- Understanding available off-the-shelf designs
- Learning well-drilling and treatment techniques for surface water sources
- Learning how to use the Red Book/Sand Book
- Planning construction education
    - Assessing host-nation level of training
    - Defining training requirements
    - Planning military/NGO/OGA

The program could include three forms of continuing education units (CEUs): self-study courses; webinars, or Internet-based seminars; and webcasts. A requirement common to all three content types would be a certificate of completion that students can print and keep in their records.

Self-Study

A great example of a self-study dL course is CE 300, Introduction to Engineering Mechanics and Design. The course is available at <*http://www.west-point.org/academy/ce300/default.htm*>. Developed by the head of the United States Military Academy (USMA) Department of Civil and Mechanical Engineering for students studying abroad, the course demonstrates the enormous potential of web-based self-study. While very effective, the course has two disadvantages: Students must have the required texts on hand, and it takes a lot of creativity, technical knowledge, and time to create. Less ambitious examples can be found in the mandatory online annual training we are all familiar with.

Webinars

In recent years, webinars have emerged within the engineering community as a popular and accepted means of attaining CEUs. They typically require students to log in at a prearranged time and involve varying degrees of teacher-student and student-student interaction. Examples of webinars tailored for civil engineering CEUs can be found at <*www.asce.org/webinar/list*>.

Webcasts

Webcasts are the least interactive—yet easiest to produce—CEU option. They are simply broadcasts of recorded content that can be accessed over the Internet, such as video recordings of classes or presentations.

Summary

The Engineer Regiment needs to establish a formal professional continuing education program to ensure that it will have competent engineers who can positively impact full spectrum operations. A joint effort between the Engineer School, USMA, and the United States Army Corps of Engineers (USACE) could provide the knowledge base and direction for the program. The Engineer School defines the course objectives and incorporates lessons learned to respond to the Army's needs. USMA and USACE could provide the technical experts to teach the classes. An online educational system could conveniently track completion of CEUs and update officer records, as well as provide officers with documentation to meet the state CEU requirements. This educational system could be developed within the framework of the Army's existing systems, while adding great benefit to the Army and individual pride and confidence among officers with PE licenses. A second-order benefit of this program would be a well-developed educational tool to enable all engineer officers to enhance their understanding of engineer solutions to problems encountered in stability operations. The Engineer School is ideally suited to act as the lifelong learning portal by offering technical reachback and managing all Engineer Captains Career Course graduates as an engineer community of practice. Finally, the systematic valuation of continuing education will undoubtedly lead to the retention of the kind of officers that the Engineer Regiment needs in order to excel in the future.

Dr. Messer is the technical director of the Department of Instruction, Directorate of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri. He retired from the Army in May 2001 as a sergeant first class after serving four stateside tours, three overseas tours, and one combat tour in Panama during Operation Just Cause. He is an Army Civilian Education System advance graduate.

Major Bert is attending the Army's Intermediate Level Education (ILE) program en route to assignment as a military transition team (MiTT) augmentee with 2d Brigade Combat Team, 3d Infantry Division. Previously, he was a platoon leader with the 11th Engineer Battalion; company commander with the 588th Engineer Battalion; and assistant professor in the Department of Civil and Mechanical Engineering, USMA. He holds a master's in civil engineering from Virginia Polytechnic Institute and State University and is a registered PE in Virginia.

Major Evers is attending the Army's ILE program en route to assignment as an MiTT augmentee at 1st Brigade Combat Team, 3d Infantry Division. Previously, he was an assistant professor in the Department of Civil and Mechanical Engineering, USMA; Commander, Bravo Company, 16th Engineer Battalion; assistant operations and training officer and adjutant, 1st Armored Division Engineer Brigade; and platoon leader and other staff positions for 8th Engineer Battalion, 1st Cavalry Division. He holds a bachelor's in civil engineering from Gonzaga University and a master's in civil engineering from the University of Washington. He is a registered PE in Washington.

Major Gash is a student at the Army Command and General Staff College, en route to assignment as brigade engineer for the 1st Heavy Brigade Combat Team, 2d Infantry Division. Previously he was a platoon leader and company executive officer in the 70th Engineer Battalion; company commander in the 864th Engineer Battalion; and assistant professor in the Department of Civil and Mechanical Engineering, USMA. He holds a bachelor's in civil engineering from USMA, a master's in geology and geophysics from the University of Missouri–Rolla, (now Missouri University of Science and Technology) and a master's in structural engineering from the University of California–Los Angeles. He is a registered PE in Ohio and Missouri.

Endnotes

[1] Missouri Division of Professional Registration, "Continuing Professional Competency for Professional Engineers Licensed in Missouri," <*http://pr.mo.gov/boards/apelsla/Continuing-Education-PE-PDH-Fact-Sheet.pdf*>, accessed 17 December 2008.

[2] Montana Board of Professional Engineers and Professional Land Surveyors, "License Information," <*http://mt.gov/dli/pel/pdf/ce_guidelines.pdf*>, accessed 16 December 2008.

[3] Ibid.

Building Great Engineers

Mentorship Working Group Update

By Lieutenant Colonel Scott C. Johnson

There is no doubt that the modular Army and engineer force has significant operational advantages. Chief among them is the ability to tailor the maneuver and engineer force to achieve mission success with the right capabilities and resources. Modularity also enables the management of modular unit personnel and equipment readiness within the Army Force Generation (ARFORGEN) process. However, there are some shortfalls in how our modular engineer force structure is being employed during this protracted war.

Universally Recognized Challenge

The following scenario is a common experience for many of our active duty engineers:

In June 2006, a young captain took command of a modular engineer company. In September 2006, his battalion commander and headquarters deployed to Afghanistan. In January 2007, his company deployed to Iraq for what became a 15-month tour. During the combat tour, his company worked for three separate engineer battalions and two different engineer brigades. Upon redeployment, he met his new battalion commander, whose predecessor had relinquished command upon redeployment in March 2008.

Within two months, this successful company commander relinquished his command to another young captain. A few months later, this experienced and high-quality officer resigned from the Army. When discussing his decision with his battalion commander, he stated that the lack of continuity in engineer leadership—related to counseling, coaching and inconsistent evaluations due to changing task organizations, and the associated staff assistance that a battalion headquarters normally provides—loomed large as a contributing factor in his decision. While he maintained e-mail and occasional telephone contact with his parent battalion commander, he still felt isolated and alone—cast aside or thrown to the sharks. . . .

Brigade combat team (BCT) engineers are also experiencing a similar form of isolation and disconnection from senior engineer leaders and the Engineer Regiment. Light and heavy BCT engineer experiences are different, but with a few exceptions neither has a direct dedicated command relationship with a senior engineer leader. Due to their placement in combined arms battalions (CABs), many of our heavy BCT engineer companies have also become maneuver-centric in terms of capability and employment.

Even when the brigade special troops battalion (BSTB) commander is an engineer and the engineer company is assigned to the BSTB, the situation isn't significantly improved. The BSTB commander must balance the need to treat all the BSTB companies and Soldiers equally to avoid the perception of favoritism within his unit. The rift that could be created by focusing heavily on engineer professional development would degrade team building within the BSTB.

The dislocation from senior engineer leader engagement isn't limited to engineers assigned to modular units. Many junior engineers are assigned to staffs in nonengineer units across the Army—from training support units to CABs to functional and maneuver enhancement brigades (MEBs). Many lack a training readiness authority (TRA), coaching or career-advising relationship with a senior engineer leader, or inclusion in engineer-related professional development opportunities.

These same situations are also occurring within our United States Army Reserve and United States Army National Guard engineer force structure. BCT engineer companies are separated from traditional regimental-affiliated command and control, technical expertise, and professional development. Modular Reserve Component engineer units are deployed without regard to TRA and state relationships, and many engineers working on staffs do not have a direct relationship with an engineer unit with TRA authority.

During the ENFORCE conference in April 2009, senior engineer leaders met to develop a course of action to address this growing challenge. Organized by Colonel Andy Phillips (Great Britain [GBR]), and facilitated by Brigadier General John Peabody and Colonel (P) "Rock" Donahue, the *Building Great Engineers* Mentorship Working Group (MWG) developed a concept to provide engineer-specific career advice and coaching within the Engineer Regiment that enhances and complements the current modular TRA relationships.

Engineer Coach and Career Advisor Concept

The engineer coach and career advisor (ECCA) is a geographically based senior engineer leader who is invested and entrusted with the responsibility of providing a forum for engineer-specific professional development, technical advice and support, and nurturing and growing Engineer Regiment esprit de corps. The ECCA relationship does not directly equate with TRA or a command or support relationship; however, leaders of engineer units have inherent ECCA responsibilities for units under their command.

For example, the engineer brigade commanders at Fort Hood, Texas, and in Germany would have ECCA responsibilities for all units for which they have direct TRA responsibility, whether they were colocated or assigned to another installation or country. Similarly, the engineer battalion commanders at Fort Stewart, Georgia, or in Schweinfurt, Germany, would have ECCA responsibilities for the units over which they exercise TRA responsibilities. Under the ECCA concept, the aforementioned Fort Hood-based brigade commander—once designated as the ECCA for Fort Hood—would be charged with executing ECCA responsibilities for all engineers assigned to Fort Hood, regardless of established TRA relationships.

The Engineer Branch proponent will be responsible for designating geographically based ECCAs within our Regular Army, Reserve, and National Guard force structure and charging them with promoting engineer-specific professional development opportunities, providing engineer technical advice and support, and nurturing and growing Engineer Regiment esprit de corps for all engineer units and personnel within their designated sphere of influence. The ECCA's responsibilities are designed to complement the direct TRA of physically and geographically separate units. Additionally, the ECCA's responsibilities are designed to be transferred to a forward-deployed senior engineer leader, or to another local senior engineer leader if the primary ECCA is deployed forward. From engineer brigade to engineer staff to engineer team or detachment, all engineer leaders should know who their primary ECCA is, whether deployed or at a permanent duty station.

ECCA Responsibilities

The following ECCA responsibilities will be published in Department of the Army Pamphlet (DA PAM) 600-3, *Officer Professional Development and Career Management*:

- Provide engineer-specific coaching and career advice to junior engineer leaders and/or engineer technical advice and support. For non-TRA units and engineer personnel, this is provided when sought or requested.
- Plan, coordinate, and provide for engineer-specific professional development opportunities for all engineers within the ECCA geographic area of responsibility.
- Promote Engineer Regiment pride, professionalism, and overall esprit de corps.
- Ensure continuity of ECCA effort and services through the designation of alternate ECCAs in the event the primary ECCA is unavailable due to geographic separation resulting from deployments.

ECCA Implementation

Several additional recommendations were developed by the *Building Great Engineers* MWG, and in subsequent discussions, that support the implementation of the ECCA program and improve its goals.

- Align, deploy, and employ modular companies and battalions as units whenever possible. Minimize the practice of deploying modular companies independently from their TRA battalion headquarters. Our United States Army Forces Command (FORSCOM) and Army Assistant Chiefs of Staff, Operations/Plans/Information Engagement (G3/5/7) engineers who work sourcing issues are our implementing agents. Expect this initiative to occur over time as unit dwell times increase.
- Assign key and developmental majors to the BCT engineer positions—and, when possible, assign former battalion commanders to division engineer positions—until an organizational change is implemented that addresses the engineer command and control challenges within the infantry, heavy, and Stryker BCTs. (The brigade engineer battalion force design update (FDU) concept is one of the proposed solutions.) Once validated and approved, the Engineer Branch, in coordination with the United States Army Engineer School commandant, is the lead in implementing this initiative. Available population, dwell time, and competing requirements for these high-demand officers will have an impact on how this initiative will move forward.

- Develop an implementation plan to reestablish and promote Army Engineer Association (AEA) chapters across the Army to assist and complement the ECCA engineer professional development and esprit de corps missions. This initiative could include reaching out to Engineer Regiment retirees and extended Servicemember families to bolster Engineer Regiment identity—expand the base.
- Empower United States Army Corps of Engineers (USACE) division and district leaders, with support from both AEA and the Society of American Military Engineers (SAME), with ECCA-like responsibilities to engage the engineers of the future currently in high school and college across the nation.

The Road Ahead

The first two recommendations will not solve the issues facing the Engineer Regiment. They will, however, position our units and leaders for greater success. Senior engineer leaders embracing and implementing the full ECCA program—coaching and providing career advice, providing engineer-specific professional development and technical assistance, and promoting Engineer Regiment esprit de corps supported by the third recommendation—will have a huge impact over time. Though institutionalizing the ECCA program within DA PAM 600-3 may take a year or more due to the update cycle, we will issue individual charters within a few months. Expect ECCA concept implementation to start with our active duty engineers, then increase to comprise the Reserve Components. Eventually, this program will expand to include our USACE districts and enable the Engineer Regiment to reach out to engineers assigned to the Regular Army and Reserve Components, recruiting, Reserve Officers' Training Corps (ROTC), and joint assignments.

Of course, there is nothing to stop engineer commanders from taking steps now to position themselves for execution within their units or outside their TRA sphere of influence. Socializing this concept with leaders outside the engineer command and control structure (for example, TRA) is deemed critical—ECCA responsibilities do not equate with TRA of nonaligned engineers. What is the strategic message? The ECCA concept will benefit the overall Engineer Regiment, to include the individual technical competence of non-TRA-aligned engineers, and engineer esprit de corps. When implemented by dedicated professional engineer leaders, the Regiment will take a giant step forward.

Lieutenant Colonel Johnson is the United States Army Engineer School Chief of Staff. He commanded the 1-3 Brigade Special Troops Battalion, 1st Brigade Combat Team, 3d Infantry Division, from 20 June 2006 to 17 June 2008. He holds a master's in administration from Central Michigan University and a master's in military arts and sciences from the School of Advanced Military Science.

Warrant Officer of the Year Award

ENFORCE 2009 featured the inaugural Engineer Warrant Officer of the Year award. The United States Army Reserve winner was Chief Warrant Officer Three (CW3) Nathan P.D. Harvel, 321st Engineer Detachment, 844th Engineer Battalion, Bethlehem, Georgia. The Chief of Engineers, Lieutenant General Robert L. Van Antwerp, presented CW3 Harvel his award during the Engineer Ball (shown above with Lieutenant Colonel Adam S. Roth, Commander, 844th Engineer Battalion). The Active Army winner was Warrant Officer One (WO1) Anthony R. Jellison, Headquarters Support Company, 46th Engineer Battalion. WO1 Jellison is currently deployed and will receive his award when he returns to home station. Congratulations to both of these officers for a job VERY well done!

Think you have the "stuff" to be the next Engineer Warrant Officer of the Year? Check out Fort Leonard Wood Pamphlet 672-1, *The Itschner, the Outstanding Engineer Platoon Leader, the Outstanding Engineer Warrant Officer, and the Van Autreve Awards and the Sturgis Medal*, for program requirements at <*http://www.wood.army.mil/doimspt/phamphlets.htm*>.

ENFORCE Council of Colonels

By Colonel James R. Rowan (Retired)

The ENFORCE Council of Colonels met on the afternoon of 21 April 2009. The meeting had been a standard event on the ENFORCE template for many years, but as the ENFORCE venue changed over the past few years, the Council of Colonels had fallen off the agenda. This year's event was highly successful, and attendees agreed that it needs to remain on the schedule.

One significant change to the Council of Colonels this year was that attendance was by invitation only. Previously, the council was open to the Regiment at large and drew a huge crowd. Limiting the members this year was done to keep the Council at a manageable size of about 60 people in order to focus the discussion. The primary invitees were current brigade commanders; colonel-level district commanders; theater engineer command chiefs of staff and deputy chiefs of staff for plans and operations; combatant command engineers; engineers on the United States Army and joint staffs; division engineers; selected program managers from the United States Army Acquisition Corps community; and our doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) domain chiefs from the United States Army Engineer School and United States Army Maneuver Support Center.

Council of Colonels at ENFORCE 2009

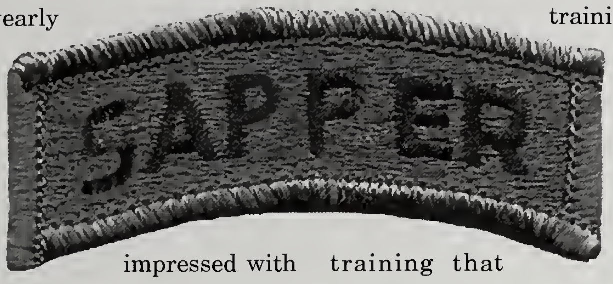
The Council of Colonels received briefings and discussed a wide range of topics. Key agenda events included a follow-on discussion from the ENFORCE Pentagon Panel plenary session, led by Mr. William E. Clarkson and Colonel James R. Rowan (Retired), which focused mainly on the brigade engineer battalion proposal; an update from Iraq by Colonel Scott F. "Rock" Donahue; an organizational update by Lieutenant Colonel Stephen A. Danner; and an update from the United States Army Forces Command engineer, Colonel Charles King (Retired), on some of the key training and sourcing challenges that we are facing to support current operations. The highlight of the Council of Colonels was the discussion with the new Engineer School commandant, Brigadier General Bryan G. Watson, who presented his draft vision and framework for the Regiment (see article on page 12). He used the collective wisdom of the Council of Colonels to refine the document and make final adjustments before sharing it with the rest of the Regiment later in the week. The ENFORCE Council of Colonels slides are posted to the Engineer School Knowledge Network site at *<https://www.us.army.mil/suite/portal/index.jsp>*.

Engineer School officials are considering making the Council of Colonels a twice-a-year event and are planning a 1- or 2-day Council of Colonels tentatively scheduled for 3-4 November 2009. For announcements with dates and other details, check the Engineer School website at *<http://www.wood.army.mil/wood_cms/usaes.shtml>* later this summer.

Colonel Rowan (Retired) is the Deputy Assistant Commandant, United States Army Engineer School. Previously, he served as the Assistant Technical Director for Military Engineering at the United States Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi. Other key duty positions include Commander, ERDC; Commander, 1st Engineer Brigade; Commander, 54th Engineer Battalion; and Commander, 16th Engineer Battalion. He has served in Operation Iraqi Freedom both as a military officer and a civilian.

A LIEUTENANT'S LOOK AT THE 2009 BEST SAPPER COMPETITION

By First Lieutenant Christopher D. Blackburn



Warm temperatures and sunny skies accompanied this year's Best Sapper Competition at Fort Leonard Wood, Missouri, framing the Engineer Regiment's most spectacular yearly event. The Sapper Leader Course cadre—augmented by a cast of hundreds of officers, noncommissioned officers (NCOs), Soldiers, and civilians—engineered a flawless contest of mental and physical strength that left competitors impressed with its rich training quality and professional execution. Teams entered the competition with victory as their foremost goal, but there is a particular group of lieutenants who may find that the value of the competition extends further than just standing on the winner's podium.

The demands of current deployment cycles leave new engineer lieutenants with one of two ways to get experience as a platoon leader: either during predeployment training or while deployed to Iraq or Afghanistan. While both experiences offer plenty of challenges and learning opportunities, platoon leader time in combat often does not expose the young officers to the wide variety of thorough, engineer-specific training that units conduct when ramping up for a deployment. For example, a new lieutenant fresh out of the Engineer Basic Officer Leader Course (BOLC) II who meets his or her unit downrange and steps into a platoon probably will not have attended a combat lifesaver course or supervised a demolitions range before leading the platoon. Besides the introductory training received

A sapper team sprints to the finish line of the obstacle course in the 2009 Best Sapper Competition.

during each phase of BOLC, platoon leader time is when a young officer is meant to benefit from the mentorship of NCOs and become proficient in engineer skills that he or she will grow to expect of all sappers. Without these training opportunities, a lieutenant in combat may be at a loss when the platoon sergeant suggests using a water impulse charge to breach a steel door or the interpreter asks how to administer an intravenous injection.

As one of those new lieutenants, I found that training for the competition provided the most comprehensive approach to make up for lost time in a garrison environment. Any participant who takes the competition seriously will naturally master basic combat engineer skills, because not doing so will certainly doom a team's competitiveness against the field. Regardless of the technique used to catch up, lieutenants must not replace their foundation of basic engineer knowledge with wartime experiences. Being a platoon leader in combat is undeniably beneficial and often the highlight of an officer's career. But what about time spent as a company commander in a different conflict—perhaps Iraq instead of Afghanistan—where the tactics, techniques, and procedures used as a platoon leader may be inappropriate? Without a strong foundation of basic engineer knowledge and an understanding of the capabilities that Soldiers and NCOs bring to the fight, a commander will struggle to appropriately direct combat power to accomplish the mission. It is up to the individual leader to conduct a self-assessment, identify deficiencies in knowledge or skills, and implement a system to ensure that these gaps are filled.

A sapper heads for the finish line after the helocast.

During no other 52-hour period in a Soldier's career will he or she be subjected to more rigorous, realistic, battle-focused training than during the Best Sapper Competition. While lieutenants typically plan rather than execute training events at squad level and below, the competition offers lieutenants a rare chance to participate for "free"—free of range control, risk assessment, ammunition draw, transportation, and every other administrative duty required to conduct training in garrison. The resourcing headache is gracefully accepted by the Sapper Leader Course cadre, giving participants an opportunity to appreciate the fruitful

A team from the 66th Engineer Company executes the weapons assembly station during the "Sapper Stakes" phase of the 2009 Best Sapper Competition.

Sappers complete the helocast/poncho raft and swim event during the 2009 Best Sapper Competition.

training and establishing a standard to emulate when planning training within their own units.

Cadets at the United States Military Academy commit to memory General Douglas MacArthur's famed opinion of athletic competition in the Army: "Upon the fields of friendly strife are sown the seeds, that upon other fields, on other days, will bear the fruits of victory." General MacArthur, then superintendent at West Point, was speaking of officer athletes attending the Academy, but his message certainly applies elsewhere. Nonstop physical and mental intensity make the Best Sapper Competition the epitome of friendly strife. Given the reliance lieutenants must place on NCOs to succeed as platoon leaders, the strengthening of the officer-NCO sapper buddy team forms the foundation for victory on other fields. Officer-NCO teams took first and second place in this year's competition, as well as the top spots in 2006 and 2007. Most lieutenants, especially platoon leaders, will never again in their careers be more closely surrounded by the experience and counsel of NCOs. This precious resource should be tapped, not just for the sake of building a competitive team but because the bond created during the competition is everlasting and represents the trademark of success throughout our Army's history. Personally speaking, it wasn't asking my sapper buddy how to throw a grapnel hook, but realizing how familiar he was with the tactical details of its employment, that was most memorable. There are many ways to learn in the Army—field manuals, college courses, officer professional development classes, for instance—but nothing tops the decades of experience and the distinctive, plain-spoken message of a prideful NCO.

This year's Best Sapper Competition was the best yet. An engineer lieutenant need not look far for motivation to prepare and compete. The competition has stiffened over the years, but not unexpectedly, considering the event's training value and the prestige of being named the Army's Best Sapper. The rewards for winning are plentiful: Remington shotguns, a Bronze Order of the de Fleury Medal, a rucksack full of gear, an Army Commendation Medal, and many other keepsakes. However, a lieutenant privileged enough to partner with the type of top-notch NCO we expect to shoulder the mission of the Engineer Regiment may have a different perspective on winning. Like past Best Sapper champions, you may be fortunate enough to combine invaluable training and NCO partnership with impressive accolades.

First Lieutenant Blackburn is a platoon leader with the 66th Engineer Company, 2d Stryker Brigade Combat Team, 25th Infantry Division, and served as a platoon leader and task force engineer during the company's deployment to Iraq from December 2007 to February 2009. He is a graduate of Ranger School and holds a bachelor's in civil engineering from the United States Military Academy.

Note: First Lieutenant Blackburn and his sapper buddy, Staff Sergeant Moises Ramirez, 66th Engineer Company from Schofield Barracks, Hawaii, finished among the top 10 in the 2009 Best Sapper Competition. First Lieutenant Blackburn also earned the Engineer Regiment's Outstanding Engineer Platoon Leader Award in 2008.

Photo by Mike Curtis

Regimental Awards

Each year we recognize the best engineer company, lieutenant, warrant officer, noncommissioned officer, and enlisted Soldier—in each of the components—for outstanding contributions and service to our Regiment and Army. Every engineer unit in the Regiment can submit the name and achievements of its best of the best to compete in these distinguished award competitions. Only the finest engineer companies and Soldiers are selected as recipients of these awards. The Soldiers will carry throughout their careers the distinction and recognition of being the Engineer Branch's best and brightest Soldiers and leaders. Following are the results of the 2008 selection boards for the Itschner, Outstanding Engineer Platoon Leader (Grizzly), and Outstanding Engineer Warrant Officer Awards, the Sturgis Medal, and the Van Autreve Award:

Active Army

Itschner Award: United States Army Pacific (USARPAC) nominee, 66th Engineer Company, 2d Stryker Brigade Combat Team, 25th Infantry Division, Schofield Barracks, Hawaii.

Outstanding Engineer Platoon Leader (Grizzly) Award: USARPAC nominee, First Lieutenant Christopher Blackburn, 66th Engineer Company, 2d Stryker Brigade Combat Team, 25th Infantry Division, Schofield Barracks, Hawaii.

Outstanding Engineer Warrant Officer Award: United States Forces Command (FORSCOM) nominee, Warrant Officer One Anthony R. Jellison, Headquarters Support Company, 46th Engineer Battalion, Fort Polk, Louisiana.

Sturgis Medal: United States Army Europe (USAREUR) nominee, Sergeant First Class (P) Marcus McClain, Alpha Company, 173d Special Troops Battalion, 173d Airborne Brigade Combat Team, Bamberg, Germany.

Van Autreve Award: FORSCOM nominee, Specialist Wesley Silver, 58th Engineer Company, 326th Engineer Battalion, Fort Irwin, California.

United States Army Reserve

Itschner Award: 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri.

Outstanding Engineer Platoon Leader (Grizzly) Award: First Lieutenant Christopher G. Smiley, 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri.

Outstanding Engineer Warrant Officer Award: Warrant Officer Three Nathan P.D. Harvel, 321st Engineer Detachment, 844th Engineer Battalion, Bethlehem, Georgia.

Sturgis Medal: Staff Sergeant Jay L. Kochuga, 336th Engineer Company, 463d Engineer Battalion, Youngwood, Pennsylvania.

Van Autreve Award: Specialist Ricky L. Weissend, 375th Engineer Company, 844th Engineer Battalion, Eva, Alabama.

Army National Guard

Itschner Award: Charlie Company, 201st Engineer Battalion, Kentucky Army National Guard, Cynthiana, Kentucky.

Outstanding Engineer Platoon Leader (Grizzly) Award: First Lieutenant Joseph W. Sloan, Charlie Company, 201st Engineer Battalion, Kentucky Army National Guard, Cynthiana, Kentucky.

Outstanding Engineer Warrant Officer Award: No nomination.

Sturgis Medal: Staff Sergeant Mark Welker, HHC, 1140th Engineer Battalion, Missouri Army National Guard, Cape Girardeau, Missouri.

Van Autreve Award: Specialist Daniel L. Macklin, 220th Engineer Company, Missouri Army National Guard, Festus, Missouri.

All of the nominees represented their major commands with the highest professionalism and dedication to the Engineer Corps's vision and deserve our highest praise. The award recipients were recognized at ENFORCE 2009 at Fort Leonard Wood, Missouri.

Building Great Engineers:

Creatively Mentoring Company Grade Officers

By Captain Robert R. Phillipson

The wars in Iraq and Afghanistan are often referred to as "company commanders' wars." Although some of these commanders are prepared for the challenges they will face in combat, others are not. We must have trained, capable engineer leaders in these positions to ensure our success. The Engineer Branch functions across the spectrum of Army operations, and as such we represent our branch to senior maneuver officers. An engineer's ability to analyze tactical problems and identify solutions can be a great asset to a brigade combat team (BCT) or battalion staff. A solid foundation in doctrine and tactics will lead to the employment of our young sappers to their full potential. So how do we best train and prepare company grade officers for their assigned duties and prepare them to interact with the maneuver leaders to provide them optimal engineer support?

Challenges

Young lieutenants and captains today face a number of challenges when arriving at their first company. For example, they probably will not get a fully-manned platoon or company or a property book with correct shortage annexes. Many of their subordinate leaders will have less than a month or two in their current grade or duty position. Within the first 90 days, some of those subordinate leaders will leave the Army or change stations. Critically, most of their subordinate leaders will be behind the normal timeline for the Noncommissioned Officer Education System, whether for the Warrior Leader Course, Basic Noncommissioned Officer Course, or Advanced Noncommissioned Officer Course. The company commander may have served in a construction battalion or held a job in the United States Army Corps of Engineers before being assigned to a heavy BCT and will face challenges understanding how to establish a training plan in preparation for combat. The United States Army's current operational tempo challenges leaders daily, and they find themselves struggling with time and resource management. Strategies to solve these problems come from cooperative interactions between leaders and subordinates and a calculated professional development plan on the part of raters and senior raters.

Effective Leadership

Some leaders are blessed with the charisma required to lead and influence sappers, while others require the support of their duty titles to accomplish these tasks. Observe leaders you serve with, adopt their positive traits, and try them within your own organizations. Encourage subordinate leaders to do the same. One of the reasons General of the Army George C. Marshall was a successful organizer and tactician was that he continuously applied different solutions to problems in a training environment and optimized how the task was accomplished. His leaders gave him the flexibility to try new solutions to problems and learn from the results he achieved. His successes in expanding his capabilities were only achieved through time and a supportive chain of command. The larger share of coaching time should be devoted to the technical and tactical aspects of the profession of arms. Effective leadership results when subordinates have institutional knowledge and are unencumbered by the tactical and administrative aspects of their assigned positions. Also, since subordinates represent their organization when attached to maneuver units, it is critical that they understand how they are integrated into maneuver planning and execution.

> *"Officers must know how to think clearly about problems of the battlefield without being entangled with elaborate techniques of leadership to be effective."*[1]
>
> *—General of the Army George C. Marshall*

Commanders are responsible for training themselves and their subordinates in the challenging environment of military service. At the National Training Center, Fort Irwin, California, we see officers who are experienced combat veterans but cannot write a tactical order because many units use an abbreviated concept of operations format in combat. There are also those who try to lead their units by themselves because they do not feel they have the time to train subordinates on administrative skills. These officers are not as successful as those who have built a team. All leaders must continuously reflect on their competence in the art and science aspects of their profession, identifying their strengths and weaknesses and continuing their extended education.

> *"Developing leaders is a priority mission in command and organizations."*[2]
>
> *—Field Manual (FM) 7-21.13, The Soldiers Guide*

Reception and Integration

During the first interaction with new subordinate leaders, it is critical to establish required standards and performance measures. These leaders operate and integrate new information at different levels. One of the strengths of the military profession is that subordinate leaders are not identical—they are individuals. The initial counseling gives them very specific guidance, the commander's expectations of them, and what they should expect from the commander. This may sound basic but, in eight years of commissioned service, only one rater gave me a complete initial counseling. This, of all counseling, is probably the most critical. To help organize that first counseling session, the following can serve as primary categories:

Leadership

"An officer is responsible for everything his organization does or fails to do." That statement sets the tone a young leader needs to focus his or her perspective. Articulate the left and right limits (probably very narrow at first), and make it plain that development will bring greater latitude. Remind him or her of the obligation to respectfully provide input to decisions and encourage discussion with you. How many commanders have an "open door" whose threshold no one dares to cross?

> *"If as an officer one does not tell blunt truths or create an environment where candor is encouraged, then [he has done himself] and the institution a disservice."*[3]
>
> *–Secretary of Defense Robert M. Gates*

"An engineer's ability to analyze tactical problems and identify solutions can be a great asset to a brigade combat team or battalion staff."

Professional Ethics

A single unethical decision by a leader can do great damage to a unit and have strategic impact. The scandal at Abu Ghraib is a reminder that ethical failure by a small group can have disastrous consequences. Spend time talking with subordinates about the relationship between officers and noncommissioned officers (NCOs). Explain to young officers the importance of that cooperative relationship and how to approach the NCO who has a decade or more of military experience. The relationship between a platoon leader and platoon sergeant is different from the relationship between a commander and a first sergeant. Adjusting perspective does not always come naturally. The first meeting between a platoon leader and his platoon sergeant is not covered in any class during the Basic Officer Leadership Course. Raters and senior raters have a professional obligation to guide their subordinates to successfully navigate their first meeting with their NCOs. They should be armed with accurate assessments of the strengths and limitations of their future NCO partners.

Professional Development

Engineer officers' career paths can be quite diverse and offer little opportunity to specialize in any one field. An engineer may spend time as a lieutenant, operating a quarry as part of an engineer battalion, and time as a captain, rated by infantry officers while assigned to an infantry unit. Engineer officers need mentorship by field grade officers. Institutional course success is not always an indicator of performance or expertise. The first tactical order that I wrote as an infantry battalion planner was returned by my battalion commander with the comment, "This is an F." He then took the time to walk me through his interpretation of a tactical order, and I began to realize the necessity of understanding how the commander visualizes the battlefield and processes information. For the next three years, with the help of my seniors, I learned as much as I could. The learning curve was steep and unforgiving.

Eight-Step Training Model. When first assessing a new officer, questions about doctrine and tactics should be posed to determine the officer's level of institutional knowledge. Then the officer should be assigned tasks that support his or her education and have an applicable outcome. The eight-step training model is a useful template; having a subordinate design ranges and produce the orders required to execute them is an effective training exercise. Not only does it require the officer to understand how to reserve the land, request the ammunition, arrange transportation, and organize support architecture, but it also requires research in Department of the Army Pamphlet 385-63, *Range Safety*, and understanding surface danger zones. Producing direct-fire control measures furthers understanding of the effects of weapon systems. Then the officer must work with NCOs to develop a comprehensive training plan—supported by doctrine—to meet the standards for executing a live-fire exercise. At the end of a single range design exercise, a baseline of knowledge is established or reinforced and the new officer knows the required standards for successful mission accomplishment. Young leaders may someday have an assignment independent of a company or battalion in combat.

> *"It took a long time to make senior officers realize that if they did not make junior officers go through the process in which they alone must make decisions or make recommendations on which decisions must be based, they hadn't done much."*[4]
>
> —*General of the Army George C. Marshall*

Doctrine. This is the foundation for all Army operations, and engineers will be asked to perform a variety of missions to the highest standards. An understanding of basic doctrine and how to apply the fundamentals to the decisionmaking process is essential. Develop a training plan in your subordinates' counseling to reinforce the troop-leading procedures. If a young leader is able to organize his thoughts within this system, it will enable effective time management. Also, understanding how to effectively use doctrinal terms is imperative. Subordinates should understand the need to become well versed in FM 1-02, *Operational Terms and Graphics*, and should not be allowed to speak in nondoctrinal terms. Speaking the language is a hallmark of credibility in the engineer profession.

History and Professional Writing. These have critical applications in professional development. The Army has a broad professional reading list that is challenging in its size and scope. Many of the books are mainstream and written before 1990. With current time limitations, topics worth studying should be specified. Ways to aid in identifying applicable texts are to seek the advice of senior leaders or to browse university courses about expected deployment locations and to scan their required reading lists. A timeline and structure for professional discussions should be established. Developing creative solutions to tactical problems requires that leaders have not only a solid base in doctrine but also in military history and professional writing.

Personal Development. It is critical for new leaders in our profession to look the part. Physical fitness is imperative. The first time a young officer is challenged by his subordinates is often at physical training when the young sappers try to determine the new leader's physical strengths and weaknesses. Poor performance there can be a challenge to the leader's credibility in other areas. Establishing goals and training plans for the new leader in terms of fitness should be part of initial counseling. In the same session, new leaders should be reminded that not looking the part can undermine professional credibility. Personal ethics must be part of this briefing as well, since an officer's personal life is always subject to scrutiny. Compromising ethical standards can result in a loss of professional credibility and effectiveness.

Basic Skills and Development. Counseling new officers quarterly is less than optimal, especially for junior lieutenants, who need to be counseled monthly. Counseling does not always have to be formal. Taking a knee with subordinates during a field training exercise is just as effective. Pick two or three traits to emphasize and concentrate on them. It is better to serve with a young officer who is an expert at a few things rather than one who is mediocre at many.

At the National Training Center, we see rotational companies ten times a year. Our team covers the full spectrum of engineer operations—from sapper companies to vertical construction companies. Fundamental skills often absent in junior officers are the ability to produce written orders to convey intent, understand how to supervise their platoon, and anticipate requirements. On the first point, without a company-level order, there is little chance that the platoon leader will generate his own. Commanders should be prepared to issue orders according to FM 5-0, *Army Planning and Orders Production*, from the first warning order to the final operations order. Enforcing this format will enable junior leaders to conduct troop-leading procedures with greater effectiveness and provide them a logical format to aid in parallel planning. The second point can be a sensitive topic. Young lieutenants and captains are also inexperienced leading in the positions they are assigned. There is often trepidation on their part to make decisions or give direction for fear of not knowing how to do it. Finally, young officers should be coached to anticipate requirements. This comes from a few months of working together, getting to know each other professionally, and understanding the commander's intent for small-unit operations in the operational environment.

Advanced Development and Sustainment. Once the initial training and coaching of subordinates is complete, commanders then have the obligation to prepare them for their next duty position. Many lieutenants and junior captains are commanding companies without the benefit of having attended the Engineer Captains Career Course. When I attended that course, I thought the amount of time spent on staff operations was excessive—until I served on a battalion staff. Young leaders deserve to prove they can perform their duties and are prepared for future staff positions. Always holding subordinates to the highest standards ensures that they present themselves and the Engineer Branch in the best possible light.

Sustainment can simply be expressed as mentorship. This relationship can be established and maintained for many years to come. The military mentor relationship starts with initial counseling and continues throughout the careers of both officers.

Develop a Plan

Ineffective time management should not be allowed to drive our subordinate leader development plans. It is imperative to take the time to identify the strengths and weaknesses of subordinates, then develop a deliberate plan of action to prepare them for their path ahead. This is a commander's professional obligation, and young sappers deserve the best we can provide.

Captain Phillipson is Tarantula 15, Light Task Force Engineer Trainer (Airborne), Operations Group, National Training Center, Fort Irwin, California. Previous assignments include platoon leader and executive officer with the 577th Engineer Battalion; assistant plans and operations (S-3) officer, S-3 and task force engineer, and Commander, Headquarters and Headquarters Company, 2d Battalion, 7th Cavalry Regiment, 4th Heavy Brigade Combat Team (HBCT), 1st Cavalry Division; and Commander, Eagle Company, 4th Battalion, 6th Infantry Regiment, 4th HBCT, 1st Armored Division. He holds an associate's degree from the New Mexico Military Academy, Roswell, and a bachelor's from the University of New Mexico at Albuquerque.

Endnotes

[1] Forrest C. Pogue, *George C. Marshall: Education of a General*, 1880-1939, Viking Press, New York, New York, p. 250.

[2] Field Manual 7-21.13, *The Soldier's Guide*, 15 October 2003.

[3] Robert Gates, "Reflections on Leadership," *Parameters: US Army War College Quarterly*, Volume XXXVIII, Issue No. 2, Summer 2008, p. 11.

[4] Pogue, p. 100.

THE ENGINEER WRITER'S GUIDE

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

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Junior Engineer Officers Get True Professional Development

By Captain L. Nicole Manteufel and Captain Jean D. Archer

The Afghanistan Engineer District (AED) of the United States Army Corps of Engineers (USACE) has partnered with Task Force Hammer, 62d Engineer Battalion (Combat) (Heavy), to implement an officer professional development program whose purpose is to exhibit broad-scale project management and retain quality company grade engineer officers by offering perspective on future Army opportunities. From February through April 2009, two-person engineer officer teams rotated through Kabul for three to five days to learn the workings of an engineer district. The teams met military and civilian staffs and learned about their various roles, visited projects in the Kabul area, attended meetings between project managers and contractors, and shadowed the district engineer commander. The goal was for each engineer officer to gain a better appreciation for project management and an awareness of opportunities within the highly diverse Engineer Regiment. Additional benefit came from interaction with professional engineers.

AED Mission

A recent trip with AED included two days of project site visits and one day of accompanying the commander. The in-brief established that the AED mission is to conduct project management, construction, and engineering in the Central Asian republic of Afghanistan to facilitate the establishment of a secure and stable environment while promoting reconstruction and infrastructure development. The multitude of AED projects varies widely in dollar value and scope, with a large percentage being the construction and operations and management of Afghan National Security Force (ANSF) complexes to support the spread of governance.

The first day of site visits included trips to observe construction at the Ministry of Defense in Kabul and inspect electrical upgrades at an Afghan National Army complex. The technical experience and professionalism that AED offers through the oversight and management of projects ensure a safe final product for the ANSF. The second day of site visits included tours of the Afghan National Military Academy (ANMA) and Kabul International Airport. The military academy, affectionately known as "East Point," was between classes and at the end of its "Beast Year" of especially intense training. AED had recently added three new ANMA cadet graduates as staff members in order to develop young Afghan officers. The stop at the airport included visits to the Afghan National Air Corps barracks, offices, and hangars. The AED had overseen their construction and now conducts operations and management there. All of these facilities and programs expand the capability of the ANSF, which validates AED's mission.

Shadowing the district engineer commander on the third day taught a lot about the workings of AED. The day included a meeting with a construction firm that has more than $100 million in contracts, and videoteleconferences with congressional staffers and students from the Maneuver Enhancement Brigade (MEB)/Brigade Special Troops Battalion (BSTB) Precommand Course at Fort Leonard Wood, Missouri. The day brought to light the immense

Cadets at the Afghan National Military Academy learn to march.

This Afghan depot was built with USACE oversight.

responsibility for construction that AED carries in rebuilding Afghanistan. For 2009, AED will have more than $4 billion in construction projects throughout Afghanistan, with a staff of just a few hundred personnel. The relationships that AED has with its contractors and diplomatic and military organizations are at the heart of building up the country's infrastructure and the ANSF, which will lead to a more stable and improved country.

Valuable Lessons

The experience taught that oversight in project management is an absolute necessity. AED has found a direct correlation between the amount of time AED quality assurance inspectors spend on-site and a contractor's quality of work and the timeliness of project completion. While U.S. troop construction projects normally are under the supervision of a platoon leader and platoon sergeant, many Commander's Emergency Response Program projects do not receive the same level of quality assurance attention, due to personnel and location limitations. Since quality assurance checks are a key part of ensuring that projects are done well, efforts should be made to train Afghan engineers to undertake this responsibility.

Another piece of information gained was the huge impact that long-lead items have on projects at all levels. Long-lead items are for a specific project that cannot easily be purchased on the local economy and must be shipped from outside the country, or which must be fabricated after an order is placed. AED project managers teach their contractors backward planning in order to finish projects on time. At the platoon and company level, the need for materials must be identified, and those materials must be diligently tracked to ensure the timely completion of projects.

The trip also revealed the future plans for water management in Afghanistan. In the past, proper studies were not conducted before the construction of dams, which resulted in the massive loss of usable farmland. Having learned from the U.S. government's failures in the 1950s to irrigate land with the Helmand Valley Authority, AED is conducting detailed studies before emplacing locks, dams, and new irrigation systems. Afghanistan needs a massive amount of water work, but it should start only after the proper data is collected. Hasty planning can yield unwanted results during execution.

In just three days, the AED officer professional development program succeeds in exposing junior officers to a critical mission and to efforts and programs they would otherwise never have known. It teaches lessons about the contracting process, the importance of project management—both by the contractor and by quality assurance officers—and the impact that AED has on the people of Afghanistan. The program has been a unique experience in which lieutenants and junior captains are able to visit multiple project sites and understand the role of AED and the opportunities other than troop-leading positions available to engineer officers to contribute to the counterinsurgency fight.

As Major General Gregg F. Martin, former United States Army Engineer School Commandant, stated, one of the greatest aspects of the Engineer Regiment is that it offers more options and transferrable skills than any other Army branch. Engineers can be anything from combat warriors to nation builders. The AED officer professional development program has embraced Task Force Hammer officers to show what great engineers can do.

Captain Manteufel has served as a platoon leader for Charlie Company, 62d Engineer Battalion (Combat) (Heavy) during the company's 15-month deployment to Afghanistan. She graduated from the United States Military Academy with a bachelor's in environmental science, then attended Basic Officer Leadership Course (BOLC) II at Fort Sill, Oklahoma, and BOLC III at Fort Leonard Wood. Upon her return to the states, she will attend the Engineer Captains Career Course at Fort Leonard Wood.

Captain Archer initially served as a platoon leader with Charlie Company, 62d Engineer Battalion (Combat) (Heavy) at Fort Hood, Texas. Upon the company's deployment to Afghanistan, she was reassigned as the company executive officer, where she has served since February 2008. She holds a bachelor's in civil engineering from the University of Florida, attended BOLC II at Fort Sill, and BOLC III at Fort Leonard Wood.

Mandatory Degrees for NCOs

By Major Dennis J. McGee

The original purpose of this article was to propose making college degrees a requirement for noncommissioned officers (NCOs), as it is for commissioned officers. However, research showed that there are already numerous programs to help Soldiers receive college credits to apply toward degrees. The focus now is to provide the critical resource of time for NCOs to get their degrees.

The United States Army has once again officially dedicated a year as the "Year of the Noncommissioned Officer (NCO)." In 1989, then Secretary of the Army John O. Marsh, Jr., along with Army Chief of Staff General Carl E. Vuono and Sergeant Major of the Army Julius W. Gates, declared the Army theme for 1989 as the "Year of the NCO." General Vuono viewed it as an opportunity to enhance the responsibilities and the status of the NCO Corps through programs that underscored the four enduring roles of the NCO: leader, trainer, role model, and standard-bearer. He authorized promotion of an additional 3,000 Soldiers to the grade of sergeant (E-5) during the last eight months of fiscal year 1989. Shortages in that grade accounted for more than 66 percent of all NCO vacancies. Approximately 60,000 of 202,000 specialists and corporals (E-4) were eligible to advance to sergeant. The Army estimated that a one percent increase in NCO operating strength caused a nearly two percent increase in the number of units reporting readiness ratings at or above their authorized level of organization. By his action, the chief of staff raised the NCO strength to nearly 276,000.[1]

There is no doubt that today's NCO Corps is unmatched anywhere in the world. The most frequently requested military-to-military security cooperation training program by other nations is for their NCOs to attend one of our NCO courses. Today's NCOs are also products of the world's best military education system. The NCO Education System (NCOES) runs the spectrum from entry level leader training at the Warrior Leader Course to the Sergeants Major Academy. Throughout the careers of all Soldiers, NCOs are required to pass through these gates in the NCOES. The courses are all well structured and designed according to a set standard of learning.

In addition to NCO academies, the Army has encouraged enlisted Soldiers to advance their education by other means. By 1952, the Army had developed the Army Education Program to allow Soldiers to attain credits for academic education. This program provided a number of ways for the enlisted Soldier to attain a high school or college diploma.[2]

Perhaps one of the biggest discriminators for promotion to the senior NCO ranks is the lack of a college degree. This has become even more important now as the Army has become greatly concerned with retaining midgrade NCOs. Like most professions, if there is no longer a chance of promotion, then many will choose to leave that career field and change jobs. On average, most NCOs have completed their first enlistment and are beyond four years of service.

By that time, they have completed several military education courses, most of which are transferable as civilian education credits. The various programs offered by the Army Continuing Education System (ACES) permit Soldiers to take advantage of online colleges and universities that offer college credit for military training and education. Additionally, these post-secondary programs offer tuition assistance, flexible degree completion timelines, and civilian licensing or certification.[3]

The Department of Veteran Affairs administers the various Montgomery-GI Bill programs that provide funding for college courses. There are also other programs that assist Soldiers with associate and baccalaureate degree programs through accredited colleges and universities and provide credit for Army institutional schooling and professional credentialing or licensing, such as—

- Army University Access Online (eArmyU)
- College of the American Soldier (CAS)

- Servicemembers Opportunity Colleges–Army Degrees (SOCAD)
- Credentialing Opportunities Online (COOL)[4]

The challenge is finding the time to complete these degree requirements outside of the Army professional NCOES. NCOs who have college degrees have usually completed them on their own time, after duty hours, in deployed combat zones, or over many weekends, usually taking several years.

If the Army is serious about recognizing its professional NCO Corps, then it should provide the opportunity for NCOs to complete their degrees either during or following one of their NCOES courses. Ideally, Soldiers attending a Basic or Advanced NCO Course (BNCOC/ANCOC) should have the opportunity to complete their associate's or bachelor's degree. The current operational tempo causes many of today's leaders to be reluctant to release their NCO leaders to attend these schools. If the Army would make it mandatory for NCOs to complete college degrees, then this could serve as an impetus to force units to send NCOs to their respective NCOES courses on time. After, or in conjunction with, the course the NCOs could complete required college courses while on temporary duty away from the distractions of a unit, in an academic environment surrounded by their peers.

Another area of concern with mandatory degrees would be the types of degree required and whether they should be in any specific functional area. The Army has many examples of professionals who perform a trade but are not officially accredited or recognized by their profession or career field. As NCOs begin to take on leadership roles, they are placed in positions within the profession of arms that require them to be experts in their field or trade. For example, an engineer equipment operator must be trained and licensed just like a civilian crane operator; surveyors must be educated on how to properly use surveying instruments, just as a state-licensed surveyor is; and a prime power specialist must be qualified much like a certified electrical contractor. Another more generic comparison would be a company first sergeant who holds a bachelor's in human resources. The first sergeant will have already completed numerous NCOES courses and is responsible for running the day-to-day operations of a company of 75 to 150 Soldiers, equivalent to a medium-size business. Since these Soldiers are receiving education and training similar or identical to their civilian counterparts, they should be receiving the same state or national licensing or certification.

The Army Career Tracker program[5] is designed to bring together under one portal all the educational resources available to guide Soldiers along a career path or military occupational specialty. The advantages of having this program complementing the NCOES have yet to be realized, but the Army should do more. Specifically, the Army should make—

- An associate degree a requirement for promotion to staff sergeant.
- A bachelor's degree a requirement for promotion to master sergeant.
- Time available at BNCOC and ANCOC to complete these degrees.

As the Army focuses this year on its NCO Corps and continues to transform the NCOES, it should make strides similar to those that were made 20 years ago during the last "Year of the NCO."

Major McGee is an engineer officer attending the School of Advanced Military Studies at the United States Army Command and General Staff College. Previous assignments include brigade operations and training (S-3) officer, 130th Engineer Brigade; battalion S-3 officer, 84th Engineer Battalion; and Commander, Alpha Company, 249th Engineer Battalion (Prime Power), Fort Lewis, Washington.

Endnotes

[1] History, "2009–The Year of the Noncommissioned Officer," <*http://www.army.mil /yearofthenco/history5 .html*>, accessed 12 May 2009.

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[5] Initiatives, "2009–The Year of the Noncommissioned Officer," <*http://www.army.mil/yearofthenco /initiatives1.html*>, website, accessed 12 May 2009.

> *Not a single one of us can afford to limp through our military life on the crutch of limited education.... Civilian education certainly enhances the individual's personal and professional value and especially the NCO's.... We aren't talking about an entry on a service record. We're talking about an individual acquiring more tools which will assist in daily living and certainly in the performance of military duties.*
>
> *—SMA Leon L. Van Autreve, "Walking Tall—and Eager," Soldiers, February 1974, p. 33*

Army Seeks Records on War on Terrorism

By Lieutenant Colonel Robert G. Smith

An assessment of collected material has identified significant gaps in the United States Army Center of Military History records on the War on Terrorism. The list below identifies the specific types of electronic and other documents being sought to fill these gaps. There is a critical need to collect the classified and unclassified operational records relating to Operation Enduring Freedom and Operation Iraqi Freedom under the provisions of Army Regulation (AR) 870-5, *Military History: Responsibilities, Policies, and Procedures*, and Field Manual 1-20, *Military History Operations*.

While many records have been collected by deployed United States Army military history detachments and other military historians, the gaps have constrained efforts by historians to chronicle the Total Army's contributions to the war. In addition, processing veterans' claims of post-traumatic stress disorder and other medical claims is extremely time-consuming due to missing or incomplete records. To date, the Army's overall collection effort has focused primarily on Regular Army and Army National Guard brigade combat teams deployed to Iraq. Coverage of the activities of smaller National Guard and United States Army Reserve units during the War on Terrorism—especially in Operation Enduring Freedom—is sorely deficient. Also, the records being collected are considered permanent historical records that must be retired through the Army records management system according to AR 25-400-2, *The Army Records Information Management System (ARIMS)*.

The Army needs help to solve this deficiency. Rather than pass the entire burden on to Army commands, the Office of the Administrative Assistant to the Secretary of the Army has tasked the United States Army Records Management and Declassification Agency and the Center of Military History to work jointly to collect these operational records. The records of the Army staff, deployed units, and commands within the continental United States that provided critical support to warfighters from 11 September 2001 to the present fall within these collection efforts. Also, individual chronicles, oral interviews, or statements collected by United States Army Training and Doctrine Command units are to be considered records for the purpose of this effort. The records being collected by the Center of Military History will be considered permanent historical records that must be retired through ARIMS, according to AR 25-400-2. Although finished products are welcome, the Center is looking for raw operational records to capture in its War on Terrorism collection mission.

Unclassified documents and questions about handling classified materials should be sent to <*GWOT collect@conus.army.mil*>.

Lieutenant Colonel Smith is the Headquarters, Department of the Army, point of contact for the Center of Military History's War on Terrorism records collection effort.

U.S.ARMY

War on Terrorism Records to Look For

Classified and Unclassified Documents of Historical Significance Required

- Command and control
- Operations plans/fragmentary orders (FRAGOs)
- Maps/charts/plans/drawings
- After-action reports
- Operations summaries/storyboards
- Award packet and witness statements
- Correspondence
  - E-mail/letters/notes
  - Meetings/minutes/messages
- Logistics plans and FRAGOs
- Senior leader guidance
- Journals
- Intelligence summaries
- Public Affairs news releases/ hometown articles
- Special studies/briefings
  - Improvised explosive devices and explosively formed projectiles
  - Up-armored vehicles
  - Videos, digital versatile discs (DVDs), compact discs (CDs)
  - Interviews–oral and video
  - Mobilization/demobilization/ movement orders, unit manning reports, and orders of battle

United States Army Center of Military History

Yokosuka Naval Base Prepares for Nuclear Aircraft Carrier

Photo by Catheren Gill

By Mr. Glenn T. Arakaki

Charting new waters in preparing Yokosuka Naval Base infrastructure for arrival of the *USS George Washington* (carrier vessel nuclear [CVN] 73)—the United States Navy's only nuclear aircraft carrier forward-deployed outside the United States—the United States Army Corps of Engineers (USACE) (Japan Engineer District), Naval Facilities Engineering Command (NAVFAC) Far East, and Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) successfully executed a multimillion-dollar military construction (MILCON) program and related projects on a very tight and demanding schedule.

Bilateral Effort

To make Yokosuka Naval Base (about 60 miles south of Tokyo) ready for the aircraft carrier, the U.S. team undertook extensive MILCON facility and utility upgrades, and the government of Japan—under the host nation-funded construction (HNFC) program managed on the U.S. side by USACE—dredged more than 700,000 cubic meters of material from Truman Bay. A multiyear bilateral effort by the United States and the government of Japan assured that all technical, political, and environmental concerns were addressed in the planning, engineering, and construction.

The *USS George Washington* contributes to peace and stability in the Pacific and provides the United States 7th Fleet with greater range and strike capability. All systems were go when the aircraft carrier arrived at Berth 12 on 25 September 2008, replacing the *USS Kitty Hawk* (CV63)—the Navy's last conventionally powered aircraft carrier, which had departed Yokosuka on 28 May 2008, slated for decommissioning. Close cooperation between Japanese and American representatives at many levels overcame a variety of challenges during the forward deployment of the *USS George Washington*.

Planning and Preparation

Foremost and impacting all aspects of the program was the finite date established for the *USS George Washington*'s arrival. The date, driven by the passing of the *USS Kitty Hawk*'s 15-year service life extension after a 1987–1991 overhaul, put the project start on a tight schedule.

Projects supporting *USS George Washington* were built on a limited-size area of Yokosuka Naval Base.

Coming on the heels of international agreement between the United States and Japan, the construction necessary to replace the *USS Kitty Hawk* could not slip.

Photo by Daniel Fujimoto

Personnel from NAVFAC Far East and Japan Engineer District Yokosuka Resident Office test temporary electrical panels during a joint safety inspection.

The security classification for the arrival of the *USS George Washington* was problematic for the design process for the project designated P-998. The USACE Honolulu Engineer District selected the architect-engineering firm Parsons Corporation for its technical expertise and requisite workforce security clearances. Although cleared U.S. employees conducted design reviews, Japanese Master Labor Contract engineers working for the United States Navy and Japan Engineer District in Yokosuka, who were most familiar with existing utilities and infrastructure, were not able to review the Parsons P-998 plans until late in the design. This made it difficult to verify for interface checks or coordinate with ongoing major construction work at Berth 12 under a separate host nation project designed years earlier in support of the *USS Kitty Hawk*.

However, weekly in-progress reviews (IPRs) by a team of USACE, NAVFAC, and Naval Sea Systems Command (NAVSEA) engineers ensured that recently completed HN construction as-built conditions were integrated into the P-998 design. Project managers from each organization brought the right expertise—USACE on government of Japan host nation and MILCON design and construction, NAVFAC on naval base/berth/power construction, and NAVSEA on nuclear-powered ship requirements.

Imperative to success throughout the make-ready program was commander support that gave the effort priority. All commanders ensured that project delivery teams (PDTs) were resourced with personnel having the right skill sets and were empowered to get results.

Rapport and Coordination

The P-998 PDT, composed of representatives from the United States Army and Navy, the United States Forces Japan (USFJ), and the government of Japan, formed an interservice, international team. This created some unique relationships in the military engineering community. Although the Navy's capability as MILCON agent worldwide is renowned, USACE (in its role as the Department of Defense-designated construction agent for Japan) brought on NAVFAC Far East as a Japan Engineer District "customer" for P-998, while at the same time NAVFAC Far East executed other projects of its own related to the stationing of the carrier. PSNS & IMF, the subject matter expert for nuclear aircraft carrier support, provided a tremendous amount of specialized technical input during design and construction phases. This required intensive coordination by Japan Engineer District team members to determine if the technical input was within the scope of the project award and would require changes or other contractual actions.

These relationships called for the establishment of rapport between Army and Navy counterparts throughout all levels of the PDT. To achieve this, a senior engineer review group (SERG) consisting of senior leaders from Japan Engineer District, NAVFAC Far East, NAVSEA, Public Works Department (PWD), Commander Fleet Activities Yokosuka (CFAY), Ship Repair Facility (SRF), and PSNS & IMF met monthly to provide effective guidance and help facilitate resolution of critical issues.

Contracting and Funding

The Japan Engineer District executed three P-998 MILCON contracts with a program amount of $67 million.

Wharf Upgrades. The approximately $36 million wharf upgrades project provided one-of-a-kind systems never before constructed overseas for the operation and maintenance of nuclear aircraft carriers. The project retrofitted Yokosuka's Berth 12 utilities to include shore power, freeze seal air, and high-pressure air systems. Parsons completed the design for a facility used to produce grade A water through filtering, reverse osmosis, degasification, and demineralization processes. PSNS & IMF procured and installed the system downstream of the storage tanks to the distribution to the carrier, while the Japan Engineer District construction contractor Tokyu Construction Company, Ltd., was responsible for the remainder of the looped system. The facility was constructed on Berth 12 after the demolition of 18,000 cubic meters of mountainside. Detailed coordination with PSNS & IMF was necessary throughout the planning, design, and construction. Due to the unique technology and site conditions, more than 60 contract changes were made for the wharf upgrade.

The project also retrofitted Berth 13 to provide "hotel" utilities by providing a potable water supply line, a wastewater forced main, and electrical distribution. Site conditions complicated the project; however, planners worked out an acceptable construction modification to meet the needs of the customer.

Berth 10/11, for the nuclear aircraft carrier maintenance barge, was constructed along an existing seawall near Berth 12. The Japan Engineer District worked with government of Japan and United States Navy entities to determine ownership and proper custody and disposal of a preexisting pontoon and executed its safe removal for nominal cost, ensuring that construction could begin in time to meet the tight schedule. Berth 10/11 is unique to the Navy for maintenance barge berthing.

The P-998 wharf upgrades, started 30 May 2006, was the largest MILCON executed by USACE for the United States Navy in Japan and the first such MILCON for Japan's second largest construction contractor, Tokyu. The construction contract was completed 6 June 2008.

Power Upgrades. This contract built a new switchgear facility for the Yokosuka Naval Base to expand the existing 60-hertz power grid. The $22 million design-build project was awarded February 2007 to Japan's largest construction contractor, Obayashi Corporation. The Japan Engineer District and the Honolulu District Regional Technical Center worked collaboratively to see the project to a 7 August 2008 contract completion. Not all challenges were technical, however. Some equipment, such as the 4.5 megavolt-ampere (MVA) frequency converter and 15 MVA synchronous condenser, were of American manufacture, causing complications for the Japanese contractor in controlling major equipment deliveries, due to export requirements.

The project installed digital supervisory controls and data acquisition (SCADA) equipment for collecting and displaying real-time operational data to the power system operators. The SCADA system encompasses a central control station, a high-bandwidth fiber distribution network and 60 intelligent remote devices that provide system parameters every two seconds, process data, and respond immediately to control signals. The new SCADA system occupies less than 10 percent of the space of the base's existing system and provides the memory capacity and expansion capability to replace it.

Power to the switchgear is provided by the existing switchgear facility at Yokosuka Naval Base and by an adjacent plant that contains three 5,820-kilowatt gas engines and a 7,200-kilowatt gas turbine for 60-hertz electrical power and steam service to shore and ship areas. Limited confines created a constantly conflicting workspace environment and necessitated daily coordination between the two projects.

Building Addition. The Japan Engineer District awarded the contract for the Building 3128 second floor addition in May 2006 to a third contractor, Ichibo Corporation, a relatively small but experienced firm that has completed U.S.-funded work across Japan. The new second floor, a $2.5 million project, houses the Commander, Submarine Group Seven (COMSUBGRU-7), command structure and was the first project finished, with construction completed in June 2007.

Photo by Yoshio Noji

Medium-voltage cabling is supported by new cable trays in a Yokosuka Naval Base utility tunnel.

Dredging Truman Bay

In addition to MILCON, the Japan Engineer District also provided construction management services consisting of engineering and construction surveillance for the host nation Facilities Improvement Program (FIP) project NA-027, Dredging of Truman Bay. The project included the dredging of Berths 8/9 and 12 and the adjacent turning basin to a depth of 15.24 meters to support movements of the *USS George Washington*. Work also included the removal and reinstallation of several buoys and their concrete moorings.

Photo by Shizuo Yoshimura

Yokosuka Naval Base Ship Repair Facility personnel connect maintenance barge spud mooring collars to piles at the new seawall.

Planners ensured that the contractor under a government of Japan contract acquired a dredge permit from the Yokosuka Port Authority and erected silt screen fences required by the city of Yokosuka. The Ministry of Environment issued a dumping permit; however, daily quantity was limited for disposal within a joint U.S. military and Japan Self-Defense Forces training area approximately 150 kilometers to the south. Additionally, the Ministry of Defense and South Kanto Defense Bureau (SKDB) worked for months to reach agreement with protestors and the Chiba fishermen's association over the project.

Although the dredge plan appeared simple, execution was complicated by ship movements, Japan Engineer District and Navy contractor activities, and bad weather. Japan Engineer District held weekly coordination meetings to resolve complex scheduling issues and to enact solutions that included night dredging, doubling the dredge fleet, increasing the number of transport ships, and coordinating the continuous reestablishment of silt screen fence boundaries. The Commander, United States Naval Forces, Japan, worked closely with the director of the SKDB to ensure that the project stayed on schedule. In dredging from 10 August 2007 through 3 August 2008, the project relocated more than 700,000 cubic meters of material.

Safety First

The projects achieved outstanding safety records—282,914 contact man-hours for the wharf upgrade and 114,660 contact man-hours for the power upgrade—with no recordable lost-time accidents. Japan Engineer District conducted safety oversight and established mentoring/capacity development relationships with the contractors. Japan Engineer District and NAVFAC funded Japanese translation of Engineer Manual (EM) 385-1-1, *Safety and Health Requirements*, to ensure that Japanese contractors had a clear understanding. Despite the challenges presented by language and cultural differences, industry practices, and variance in U.S. and Japanese safety regulations, the following helped ensure accident prevention and awareness:

- Effective use of composite risk management principles
- Preparatory safety meetings
- Management staff safety surveillance
- Routine joint safety inspections
- Daily contractor safety tool box meetings
- Proactive quality assurance representatives and contractor safety and occupational health officers
- The mindset that "Everyone is a Safety Officer"

The final result in this complex, multicontract project was on-time and within-budget delivery of shore-to-ship support systems for the *USS George Washington*.

Mr. Arakaki is the Chief, Navy/Marine Corps Branch, Programs and Project Management Division, Japan Engineer District, United States Army Corps of Engineers. He holds a bachelor's in mechanical engineering from California State Polytechnic University, San Luis Obispo.

Note: On 10 July 2009, USACE announced that the Japan District PDT for the Navy MILCON Project P-998 Wharf Upgrade, Power Upgrade, Building 3128 Addition, and the Host Nation Project Dredge Truman Bay won the 2009 USACE PDT of the Year Honors Award. USACE commended the PDT for "completing the project and associated facilities well below the USACE metrics for cost and time growth. The PDT coordinated a highly complex program with several U.S. Navy organizations, the U.S. Forces Japan and, most important, with the Host Nation of Japan."

Restoration of Davids Island

By Dr. JoAnne Castagna

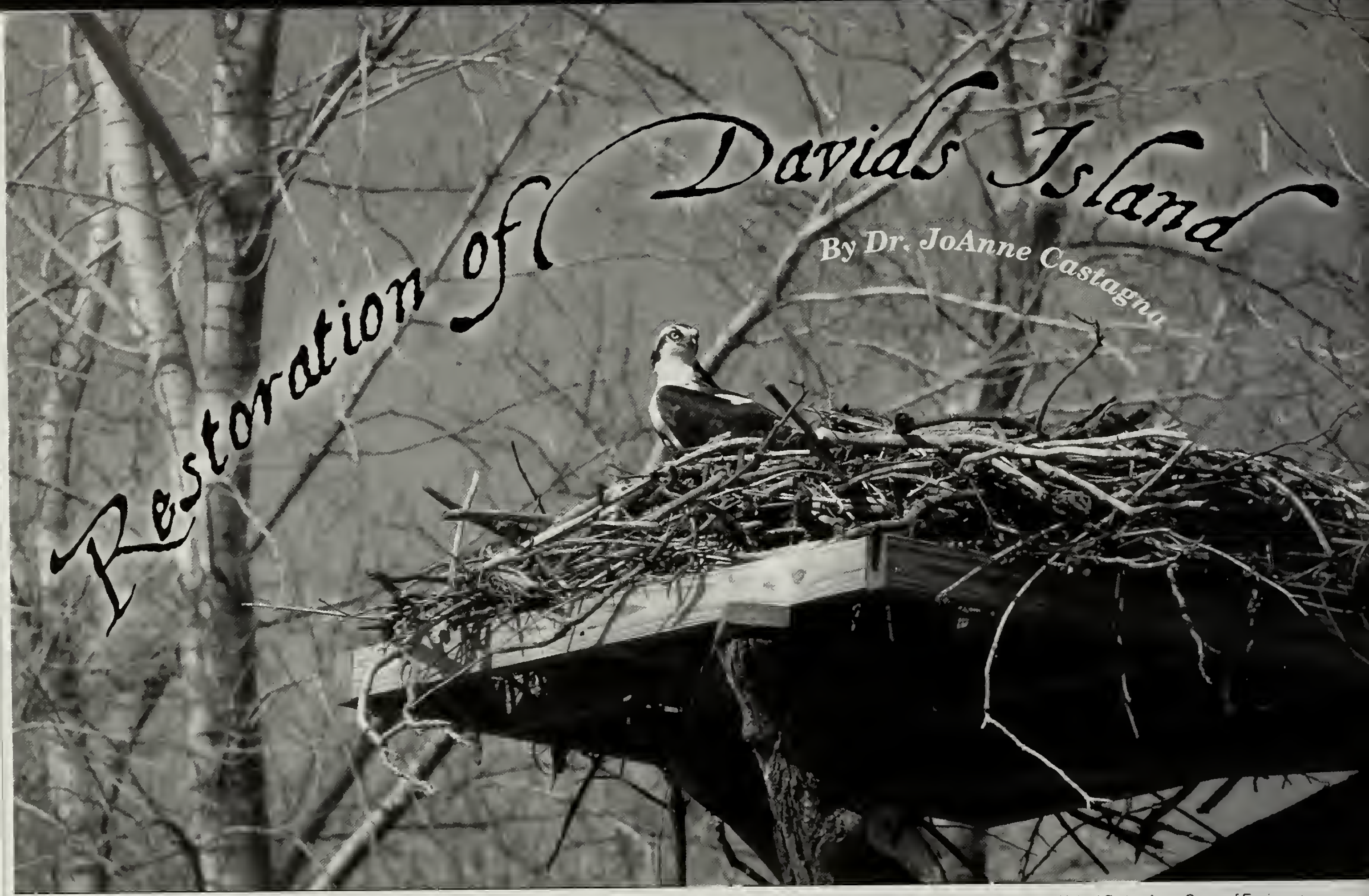


Photo courtesy United States Army Corps of Engineers

Decaying homes with blown-out windows, overgrown grass on lawns, and 1950s vintage cars parked in dilapidated garages. That was the scene at Davids Island—more like the surreal landscape in a disaster movie, as if the residents of this little village just picked up and left. This aptly describes the abandoned remains of Fort Slocum, a former United States military base that at one time occupied Davids Island, an uninhabited 80-acre piece of property located in the Long Island Sound, one-half mile off the shore of New Rochelle, New York.

In December 2008, the United States Army Corps of Engineers completed its work at the site (begun in 2005) of demolishing and removing 93 decaying structures, thereby creating open space. This work was performed at the request of the Office of Economic Adjustment and the city of New Rochelle, the island's owner, who plans to revive it and make it accessible for public use.

Military Chronicle

In 1867, Fort Slocum was established on the island where a Civil War hospital once stood, and in over a century the fort has reappeared in various military incarnations. The active post was used for several years by the United States Air Force and has served as a military hospital, an artillery mortar battery, and a training post. Fort Slocum was a staging area for troops heading overseas during the two world wars, and during World War II was the most active recruitment center in the United States.

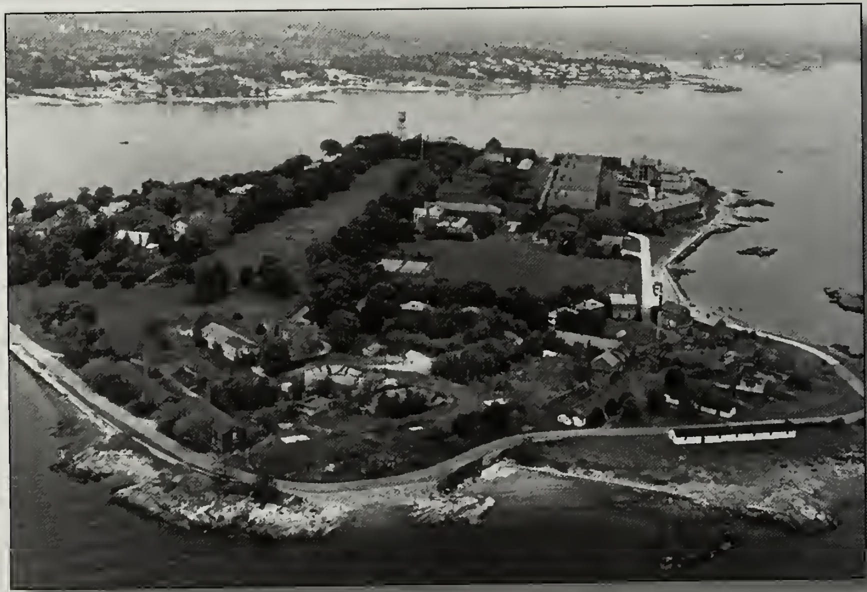


Photo courtesy Fort Slocum Alumni and Friends Collection

Oblique aerial photograph of Fort Slocum, 15 November 1961

The fort's last military incarnation was as a missile command base in the 1960s. Since then, the island has lain dormant, and the public has been denied access. However, Davids Island has been eyed as a possible location for a power plant. In addition, the sanctuary's wide variety of marine life and birds and more than a mile of beach have made it tempting for real estate mogul Donald Trump to consider placing luxury condos on its shores. For whatever purpose is decided for the island, the Corps has made the site clean and safe for the public while also preserving the area's wildlife—which includes threatened animal species—and its rich military history.

Ecological and Historical Concerns

In more recent years, Davids Island has been considered as a location for a public park and nature preserve. In New York State, the osprey is considered a "species of concern," which means the bird's population has declined in the past and is making a slow recovery. The first task the project team performed before beginning any demolition was to move a large osprey family nest inland from the island's pier in order to protect it from the construction.

The project might seem an easy one—demolishing buildings with a standard complement of the right equipment. But more than that, there was great interest to preserve some of the rich history of the island. The Corps understood this and, as in many times past, came up with a variety of solutions to support the historical aspects of the project. Extensive research was performed on each of the island's 93 structures, which were of varying military architectural styles.

This research included digging up historical data, taking photos, and performing archeological studies. About one-third of the structures were identified as having historical or archeological significance and, if desired, could be restored or partially restored. After research was completed on each of the buildings, the structures were demolished if they were determined not restorable. In this way, construction and historical preservation efforts worked in tandem to move the project forward without wasting time and money.

Demolition or Preservation

Last fall, one of the key structures on the island was demolished, marking the near completion of the project. The island's large water tower that has been a sailing "landmark" for more than 78 years, and which marks the edge of the island, was brought down. Much of the material waste from the demolition that included a large amount of steel is being recycled, especially from the water tower. Hazardous materials, such as asbestos, are being removed and brought to licensed facilities.

The Corps worked with a number of interested parties from Westchester County and the city of New Rochelle to determine what should be done with those historic structures that could be preserved. City officials decided to not restore any of the island's structures to avoid funding their maintenance before the use of the island is determined. However, remnants of the former fort will be preserved on the island for the public to view, including the fort's overall landscaped vegetation, a seawall, the flagpole, mortar pits from the late nineteenth century, tennis courts, walkways, and a cannon used during the Spanish-American War.

Photo courtesy Tetra Tech EC, Inc.

Drill Hall/gymnasium, built in 1909

Summary

To enable the public to find out more about these historic items—as well as other aspects of the fort—the Corps, the Westchester County Historical Society, and the New Rochelle Public Library are collaborating to create a virtual archive and public exhibit that will be viewable on the Internet. This virtual archive and exhibit will include all of the extensive research the Corps gathered during this project, in both print and audio formats, including the historical data on each of the fort's structures, photos, maps, videos, and oral histories from more than two dozen individuals who used to live and work at Fort Slocum. In addition, various museums will include the Corps reports in their archives.

The future of the island is still undecided, but what is certain is that what has primarily been a wildlife sanctuary will soon be accessible to the public. And speaking of wildlife, the osprey family—whose nest had to be moved at the beginning of this project—has since grown threefold. Maybe this signifies an adaptable and prosperous future for Davids Island.

Dr. Castagna is a technical writer-editor for the United States Army Corps of Engineers, New York District. She can be reached at <joanne.castagna@usace.army.mil>.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Jan 04	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Published.
Organizational Manuals			
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations –Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** Published February 2009. To be consolidated into FM 3-34 in 4QFY10.
FM 3-34.23 (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15, and FM 5-116. **Status:** To be published in 4QFY09. To be consolidated into FM 3-34 in 4QFY10.
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations.* Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The United States Marine Corps (USMC) plans to adopt this manual as well. **Status:** To be published in 4QFY10.
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Pending (Sept 94) (Mar 85)	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE) and full spectrum operations, along with emerging doctrine on networked munitions. **Status:** On hold for release of FM 3-90, *Tactics.*
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This manual provides survivability information needed by commanders and staffs at the tactical level. It includes guidance on integrating survivability into planning and orders production and creation of the engineer running estimate. It provides examples of a survivability capabilities card, matrix, and timeline to assist with the planning, revision, and conduct of specific survivability tasks. The USMC plans to adopt this manual as well. **Status:** On hold; no rewrite date projected.
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This manual describes the operational environment (OE) and how to apply and integrate general engineering principles in support of full spectrum operations. It focuses on the establishment and maintenance of lines of communication and engineer support to sustainment operations throughout the area of operations. Although not designated as a multi-Service publication, it is intended to inform all Service components of the types of general engineering tasks, planning considerations, the variety of units available to perform them, and the capabilities of Army engineers to accomplish them. The USMC designation will be added to this manual. **Status:** Published 9 December 2008.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering			
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations (TO) in the design of roads, airfields, and helipads. It is currently dual-designated with the Air Force. The Air Force (as well as the Navy and USMC) plans to adopt the new manual also. **Status:** Pending completion of drainage chapter.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The USMC plans to adopt this manual as well. **Status:** Preparing final approved draft: to be published in 1QFY10.
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. **Status:** Preparing Volume II. Initial draft staffing of both volumes in 1QFY10.
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and USMC includes the newest technologies, current practices, and revised formulas. **Status:** Estimated date for posting to Army Knowledge Online (AKO) is 4QFY09.
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	This manual gives directions on deploying and using engineer firefighting teams. These teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a TO. This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status:** Initiating the program directive and developing the initial draft.
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** Estimated date for posting to AKO is 4QFY09.
Geospatial Engineering			
FM 3-34.600 (FM 3-34-230)	*Geospatial Operations*	3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Estimated date for posting to AKO is 1QFY10.

NOTEs: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 10 February 2009.

Engineer Skills Development Workshop

By Captain Sharmistha Mohapatra

The Engineer Skills Development Workshop (ESDW), a Commander's Emergency Response Program (CERP)-funded training and education initiative, is founded on an Afghan-American partnership that is developing a skilled construction workforce capacity in one of Afghanistan's most remote provinces. Of the nearly 400,000 people who live in the province, 99 percent live in rural districts with minimal exposure to skills enhancement opportunities. Half of the province is mountainous, and the eastern side borders the hinterlands of Pakistan. This geography explains why the region is accessible to insurgent forces that run intimidation and recruiting campaigns among the population. To counteract their influence, the government of the Islamic Republic of Afghanistan aims to bring development to its citizens in the forms of infrastructure improvements and educational opportunities.

Conception

The Afghan Skilled Labor Academy, simply called the Winter Workshop, was executed first by Task Force Pacemaker, 864th Engineer Battalion (Combat) (Heavy), and the provincial reconstruction team (PRT) in February 2006. It was conducted in the winter when the construction tempo was low, allowing Soldiers to serve as instructors. The immediate purpose was to teach Afghan contractors and their laborers construction skills in carpentry and masonry. The Task Force

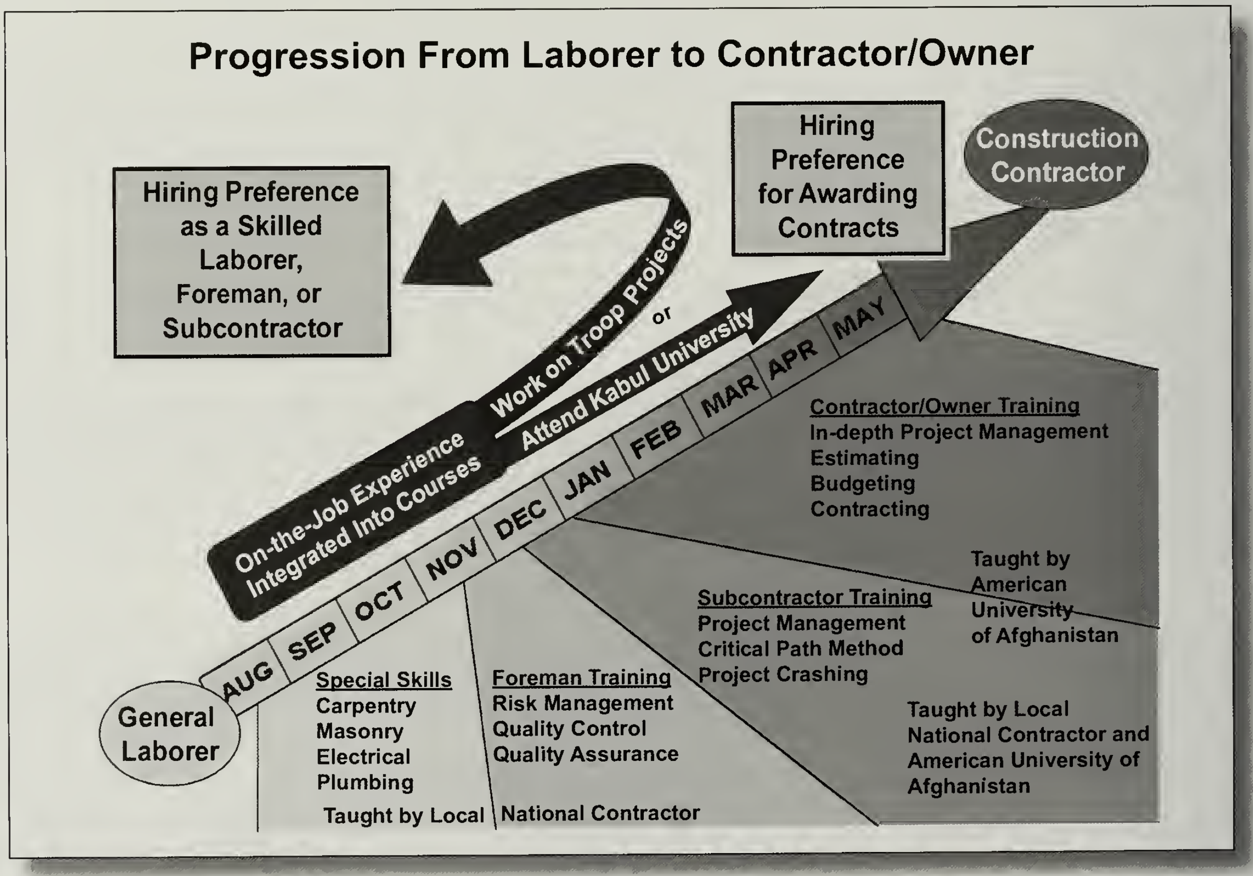
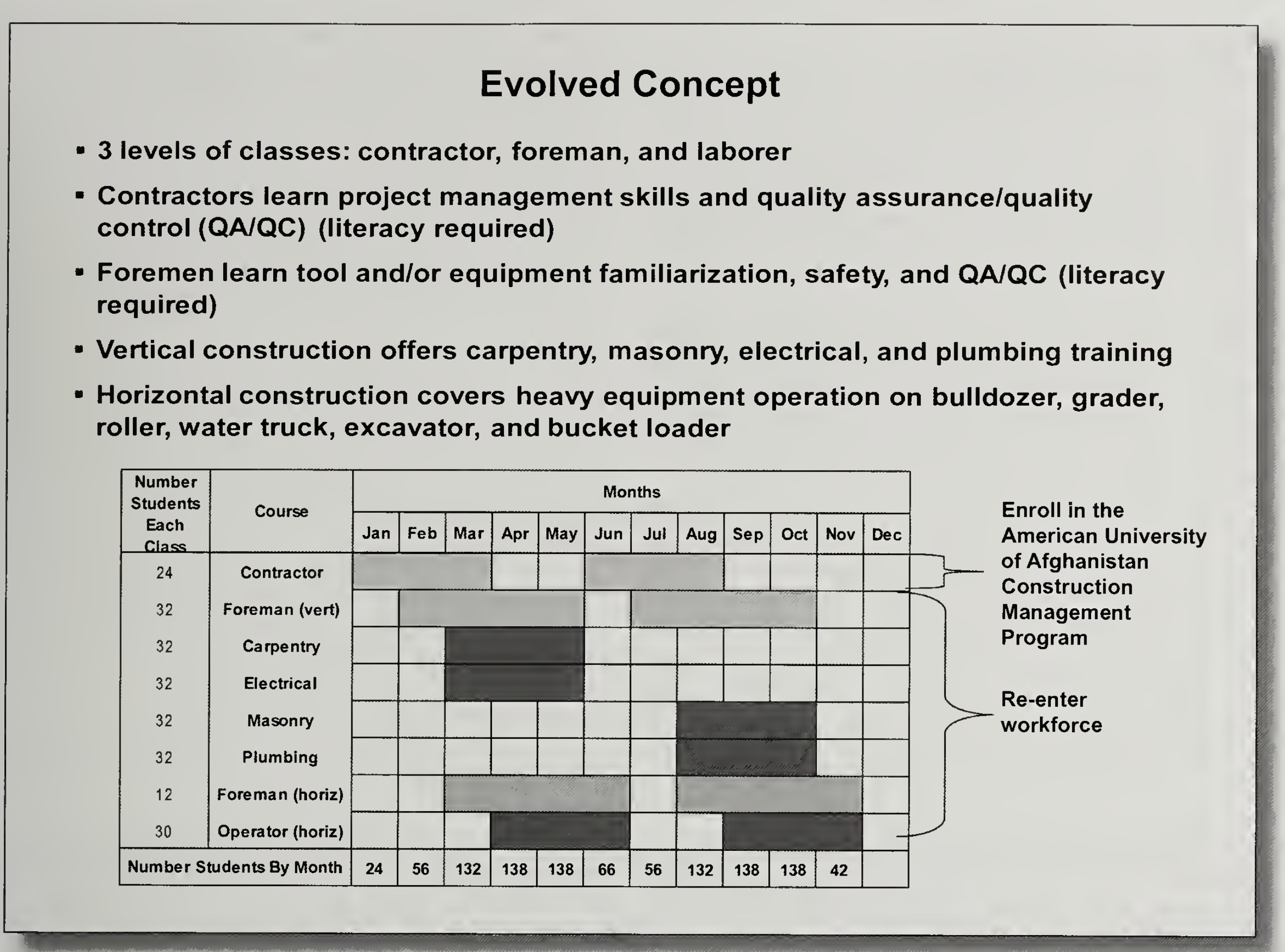

Progression From Laborer to Contractor/Owner
Hiring Preference as a Skilled Laborer, Foreman, or Subcontractor
Hiring Preference for Awarding Contracts
Construction Contractor
Work on Troop Projects
or
Attend Kabul University
On-the-Job Experience Integrated Into Courses
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
General Laborer
Contractor/Owner Training
In-depth Project Management
Estimating
Budgeting
Contracting
Taught by American University of Afghanistan
Subcontractor Training
Project Management
Critical Path Method
Project Crashing
Taught by Local National Contractor and American University of Afghanistan
Special Skills
Carpentry
Masonry
Electrical
Plumbing
Foreman Training
Risk Management
Quality Control
Quality Assurance
Taught by Local National Contractor

Figure 1



Evolved Concept

- 3 levels of classes: contractor, foreman, and laborer
- Contractors learn project management skills and quality assurance/quality control (QA/QC) (literacy required)
- Foremen learn tool and/or equipment familiarization, safety, and QA/QC (literacy required)
- Vertical construction offers carpentry, masonry, electrical, and plumbing training
- Horizontal construction covers heavy equipment operation on bulldozer, grader, roller, water truck, excavator, and bucket loader

Number Students Each Class	Course	Months											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
24	Contractor	▨	▨	▨			▨	▨	▨				
32	Foreman (vert)		▨	▨	▨	▨		▨	▨	▨	▨		
32	Carpentry			■	■	■							
32	Electrical			■	■	■							
32	Masonry								■	■	■		
32	Plumbing								■	■	■		
12	Foreman (horiz)			▨	▨	▨	▨		▨	▨	▨	▨	
30	Operator (horiz)				■	■	■			■	■	■	
Number Students By Month		24	56	132	138	138	66	56	132	138	138	42	

Enroll in the American University of Afghanistan Construction Management Program

Re-enter workforce

Figure 2

Pacemaker engineer leadership, having received insight from visiting jobsites and talking to contractors, developed the curriculum for the original Winter Workshop using as a template a course taught at Gulfport, Mississippi. The PRT facilitated the local government advertisement and press coverage while the provincial engineer was responsible for civilian enrollment. A contractor provided CERP-funded billeting, food, transportation, tools, and materials for the students. Total expenses came to $198,500.

The planning committee decided to start with a 40-hour, 7-day workshop. Ten Afghan National Army engineers attended a practice training session, giving the U.S. military instructors time to rehearse and amend the curriculum. For the workshop itself, 63 civilian contractors and laborers enrolled. For the first 3 days, students built wooden guard shacks; for the last 3 days, they placed a concrete slab and constructed a short masonry wall. During the classroom training, contractor students shared their business experiences and practices, to include contract reading, quality control, and quality assurance. Though brief, the discussion proved that students thirsted for knowledge of the construction business. Graduation was held on the seventh day, with graduates receiving certificates of completion from local Afghan government officials. The students also were presented with their tools to give them an advantage in securing employment.

This first workshop served as a base from which advanced workshops could be developed and exported to other regions throughout Afghanistan. During the first quarter of 2008, Task Force Pacemaker, on its second Operation Enduring Freedom tour, took the next step to spread this initiative. It conducted 1-week workshops at forward operating bases (FOBs) in two regional provinces, training more than 180 Afghans. At one FOB, 25 students went on to gain employment on the base. While contractors provided the logistical support for the training, there remained heavy United States Army involvement in coordinating the instruction and administration of the program. Total expenses came to $540,000.

Advanced Development

In May 2008, Task Force Hammer, 62d Engineer Battalion, began to amplify the efforts of Task Force Pacemaker by planning for a year-round program with additional construction subjects taught in a three-tiered, progressive approach. The new curriculum—the ESDW—consisted of four vertical construction courses in the first tier:

- 10 days of carpentry training
- 15 days of masonry training

- 12 days of electrical training
- 8 days of plumbing training

After completing the first tier of laborer training, exceptional students could move up to the second tier with 14 days of foreman training, then to the third tier with 10 days of subcontractor training. A fourth tier, yet to be developed, will provide university-level construction management training for contractors.

Each laborer class covered the fundamentals of construction, including safety practices and international building standards. Students received hands-on training on projects such as constructing a hut, placing a concrete pad, wiring an electrical system, or installing a water basin. Students exhibiting higher aptitudes were recommended by the course's Afghan technical director to pursue the foreman course, which starts with practical laborer construction skills and then advances to materials estimation, risk management, and quality control. Finally, the subcontractor course emphasizes project management for those seeking, or already working in, supervisory positions. Each course was planned not to exceed 2 weeks so that graduates could return to the workforce quickly, minimizing disruption to their wage-earning potential. Despite losing 8 to 15 days of wages, the benefit of attending a course yielded workers with higher earning power as semiskilled laborers.

To execute this design full-time, the civil-military operations (CMO) section had to overcome resource restrictions. Because troops were unavailable as instructors and only two people were in the section, CMO hired nine trilingual Afghan engineers as the primary instructors of the training. These men were employed by the same contractor who provided the materials and tools for the workshops. In August, the section ran a 2-week train-the-trainer session to prepare the instructors to lead their own classes in technical and administrative faculties. Members of the CMO section realized that shifting from a military-led to an Afghan-led program would be beneficial for several reasons. It would minimize language and cultural barriers between students and instructors and give students educated role models from among their own countrymen. Putting the training onus on the Afghan instructors would also force the staff to implement their own chain of command and develop their own leadership skills. In the long run, this model would ease the transition to total autonomy.

To maximize government involvement, the provincial governor reviewed and approved the training initiative and delegated advertisement and student recruitment to his director of social work and labor. This director was responsible for passing on the compiled list of students to the contracted all-Afghan instructor team, which then provided students with free lodging, food, transportation, take-home safety equipment and tools, materials, and invaluable training for the duration of the course.

From September 2008 through February 2009, vertical construction training took place on an FOB to provide a secure training site and to allow the CMO section to provide constant technical and administrative guidance to the ESDW staff. During this time, the staff conducted one masonry, one electrical, one plumbing, one foreman, one contractor (revised from being called subcontractor), and two carpentry classes. In after-action reviews, students surprisingly commented that they wanted longer courses with more exposure to practical construction. They recommended teaching additional subjects such as furniture making, insulation installation, generator repair, shower installation, steelwork, and materials testing.

From October through November 2008, a second contract executed the horizontal ESDW. This training took place both on and off the FOB, led by a technical director-engineer and 11 skilled operator-instructors. The students spent 11 days learning to operate heavy equipment, including bulldozers, graders, rollers, water trucks, and bucket loaders. Then they spent 5 days on a capstone road project for the local bazaar. The ensuing foreman class ran for 15 days, executing road and land upgrades around the city. Combining construction training with urban development projects spurred the idea of including this practice in the vertical ESDW as well. This benefited the city and gave students a sense of civic pride. A downside to the horizontal ESDW was that because of poor recruitment efforts, only 22 students arrived to fill the 42 allotted slots. For the ensuing courses, Task Force Hammer got the word out on the provincial radio station. As time progressed, this enrollment method was successful and the coordination responsibility was passed on to the contractors.

It became apparent that the vertical engineering instructors, though technically savvy, lacked sufficient practical construction experience. In January 2009—at the instructors' request—the CMO section augmented the training team with skilled workers from each trade. Henceforth, each engineer was paired with a tradesman in a relationship analogous to a platoon leader and platoon sergeant. After integrating the new staff (to include a second technical director), it became the natural course of action to divide the instructors and execute two simultaneous skilled-trade courses. This maintained an ideal ratio of one instructor to four students and generated geometric growth in the ESDW program.

In February, the officer in charge of the Task Force Hammer CMO met with a representative from the United States Agency for International Development (USAID) to exchange information about the ESDW program and another training center, which offers 3-month classes in construction skills. The Task Force Hammer officer came away with instructional material needed for lengthening classes, and the USAID advisor came away with the tiered-training model of skills development. Back at the FOB, the vertical workshop engineers incorporated the new material into their existing training plan and identified civic projects for practical training. The new program, scheduled to go into effect in June, implemented a reverse tiered-training approach. Instead of conducting separate classes that progressed from laborer to foreman to contractor, the class was a semester-long collaborative effort, with students interacting as they would in real-world projects.

In the midst of planning curriculum changes, the vertical ESDW reached a critical milestone during April—the movement of the training site from the FOB into the provincial capital. The provincial director of tribal affairs volunteered his compound for classroom space in exchange for an upgrade of his grounds and buildings. This move allowed greater accessibility to the population, which otherwise would have been afraid to come onto the FOB. In addition, the physical transition signified a crucial step that the ESDW instructors took toward autonomy.

During this time, Task Force Storm, 168th Engineer Brigade, obtained the Green Machine, an apparatus for making bricks from compressed earth. This novel technology uses natural soil mixed with a minimal amount of cement to produce interlocking bricks that do not require mortar. The spring masonry class experimented with this machine, using the bricks to construct a test building for the tribal affairs compound. Time will tell how these bricks fare in Afghanistan and whether their use will be a viable alternative construction method in an earthquake zone.

April also marked the beginning of the second round of horizontal workshops. The contract implemented the reverse-tiered, semester program with the first 21 days dedicated to foreman training, followed by 66 days of joint foreman and operator collaboration. Equipment familiarization took place on the FOB for the first month and the practical roadwork projects began in June. The contractor's design engineer had met with the local mayor to identify and prioritize horizontal projects, to include road upgrades for the bazaar and earthwork for a future subdivision.

Statistics

As of 13 June 2009, the ESDW had graduated 247 Afghans and presented a total of 299 certificates, including the students who returned for additional courses. The ages of students ranged from 15 to 60 years, with an average of 20.2 years. Graduates had an average of 9 years in the workforce but only 3 years of formal schooling. Only 40 percent of the laborer students were literate, hence the impetus to improve their handiwork skills. Foreman and contractor students, in order to be capable supervisors, had to be able to read and write to enroll. Fifty-four percent of the graduates were married, with an average household size of 12.3 per student, making secondary benefits available to more than 2,300 family members. Although tracking students after they graduated was difficult, it was safe to presume that at least 40 percent of graduates received a job immediately after course completion.

Carpentry students erect a wall for a B-hut.

A technical director reviews B-hut designs and work schedules with a student.

In the 11 months that the initial vertical ESDW ran, more than $1.2 million were injected into the local Afghan economy through the purchase of tools, equipment and materials and the salaries for 32 employees. Total expenditures for the fall 2008 horizontal ESDW came to $394,796, including the cost of 13 pieces of rented heavy equipment, salaries for 23 employees, and gravel.

Way Ahead

Currently, the focus is on shifting from the short training sessions to the semester program. On 28 June 2009, the contractor class began with 10 days of theoretical work, followed by 21 days of joint training with the vertical foreman class and another 21 days of joint training with the horizontal foreman class. This concept was designed to give contractors enough field time in both vertical and horizontal disciplines to practice their planning and supervisory skills. The vertical foreman class, after its initial 3 weeks of hands-on construction, will then go on to train and supervise the follow-on laborer students—either masonry and plumbing or carpentry and electrical—for another 76 days. In total, contractors will receive 52 days of training, vertical foremen 97 days, vertical laborers 76 days, horizontal foremen 87 days, and heavy equipment operators 66 days. The extended duration meets the requests of the students and follows the USAID model. Student stipends matching unskilled laborer wages serve to alleviate enrollee worry about lost earnings.

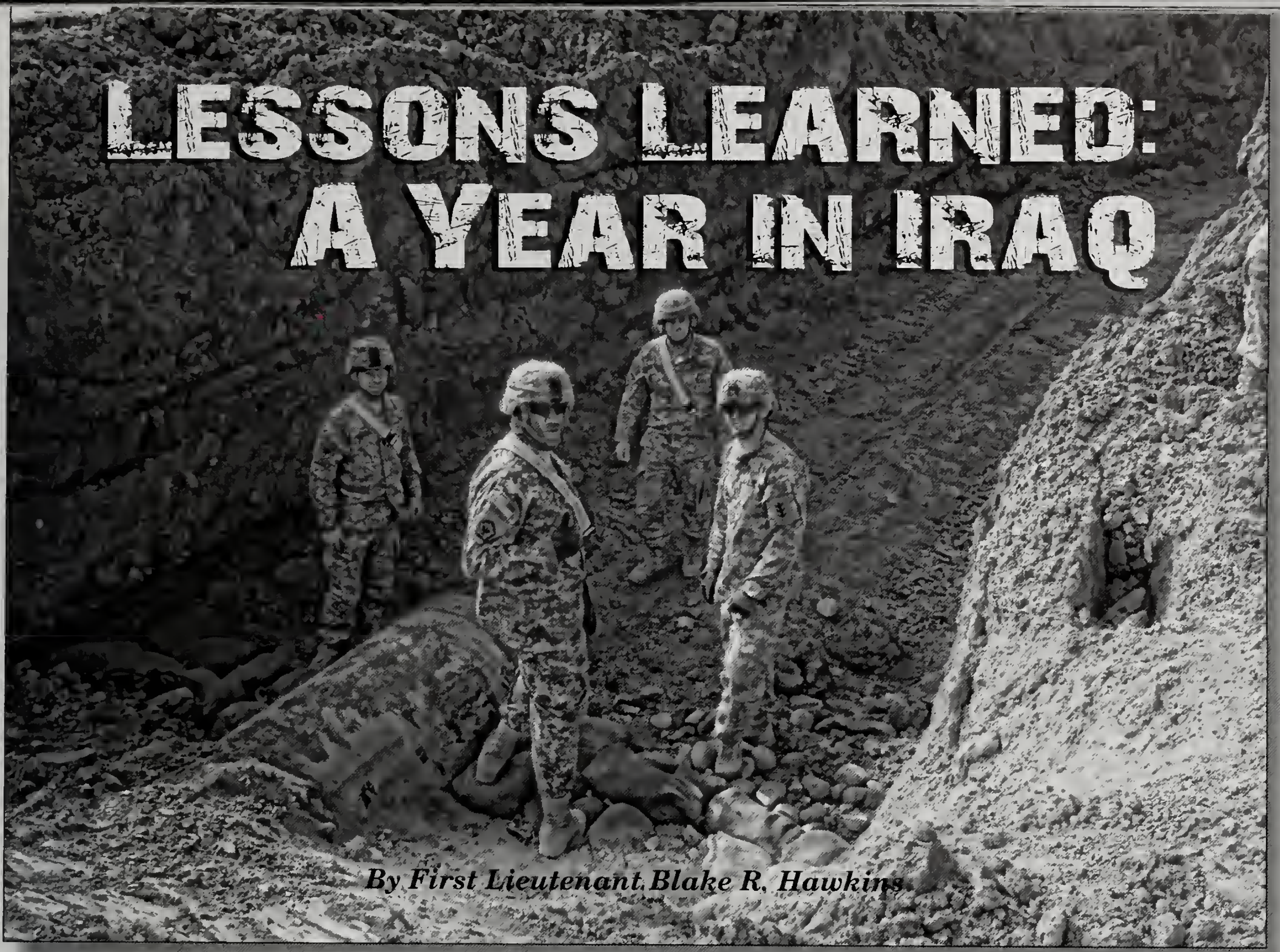
The long-term vision is to establish the provincial capital as the education and trades training hub of the region. One of Task Force Hammer's final accomplishments was winning approval from the Ministry of Education to occupy the local Center for Educational Excellence facility for the workshops. Using this location gives both workshops a centralized location to work and consolidate both vertical and horizontal ESDW staff and students. It also provides free lodging for out-of-town students.

Additionally, Combined Task Force Castle, 420th Engineer Brigade, began talks with a couple of American universities to develop a 2-year construction management degree program for contractors. The idea was to send exceptional students, engineers, and current contractors to Kabul for further study in an emerging construction management major program at the American University of Afghanistan (AUoA). When Combined Task Force Castle redeployed in March 2009, this initiative was passed on to the incoming unit, Combined Task Force Storm.

Although currently there is collaboration between the Afghan government and coalition forces, the ultimate goal for the ESDW is to be a self-sustaining entity that continues to shine as a beacon of progress for the people of the province. With the provincial government having very limited funds, the appeal must be directed at the national ministerial levels. Some suggestions have been to request support from the Ministries of Labor, Social Affairs, Martyrs, and Disabled; Rural Rehabilitation and Development; or Transport and Civil Aviation. Another possibility under consideration is to request financial support from the Ministry of Defense in exchange for training Afghan National Army engineers in a program resembling advanced individual training in the United States Army.

Captain Mohapatra is the civil-military operations officer in charge for the 62d Engineer Battalion (Combat) (Heavy), 168th Engineer Brigade. Previously she was an earthmoving platoon leader with the 62d Engineer Battalion, and a support platoon leader with the Special Troops Battalion, 2d Brigade Combat Team, 4th Infantry Division. She is a 2006 honor graduate of the Engineer Officer Basic Course at Fort Leonard Wood, Missouri.

LESSONS LEARNED: A YEAR IN IRAQ



By First Lieutenant Blake R. Hawkins

This summary of lessons learned after a year as a platoon leader of a horizontal construction platoon in Iraq details what one unit learned that might help other units that deploy. It will also serve as a reference for the specific missions our platoon executed and what we learned from them. The lessons learned apply across a broad spectrum of operations, no matter what engineer missions are being performed. The 561st Engineer Company deployed with more than 150 Soldiers—3 line platoons, and 1 maintenance platoon during Operation Iraqi Freedom. The platoons included 2 horizontal platoons and 1 vertical platoon.

One of the most important things we learned—through good and bad experiences—is the importance of a reconnaissance. The unit being serviced will send pictures and descriptions of the work it wants done and may even specify what equipment to bring. But that unit's leaders probably are not engineers, and even if they are, they will not be executing the mission. The battalion will be pushing for an accurate schedule and the earliest possible start date. Remember that the schedule is likely to be much more accurate if you have walked the site yourself. It could save additional trips to bring up equipment that you would not realize you needed if you had not been to the site before.

We also found out the hard way that the platoon needs a little time between long missions—generally anything longer than 10 days. The unit needs maintenance time for any of the equipment that malfunctioned during the previous mission and to prepare and resource the equipment set for the next mission. Also, it will keep morale higher if the Soldiers have time to recover from long days on the worksite and enjoy whatever local amenities are available. It is important to be aware of the effects that long back-to-back missions can have on Soldiers, especially if they are pushed hard to complete those missions by a certain date. Finishing projects early did not lengthen our time between missions because there was always another project waiting. Leaders should give Soldiers days off while on the project, because that is one of the few times they can control their own schedule.

Between missions, it is vitally important to keep the equipment running properly in case it is needed for the next mission. This is also the time to accomplish all the different services, annual and semiannual, before the next mission starts. Make friends with the Soldiers in the maintenance section. If they want to help you, a lot can be accomplished in a short amount of time. For any mission that requires a lot of equipment, it is also important to take mechanics; repair parts; and petroleum, oil, and lubricants. Equipment breaks down, and most forward operating bases (FOBs) do not have mechanics who know how to work on engineer equipment or have parts for it.

No matter what the mission is, don't forget about drainage. It does rain in Iraq, and the water does not infiltrate the ground as it does in most places in the world, sitting instead on top of the ground for days at a time. The finished

"One of the most important things we learned—through good and bad experiences—is the importance of a reconnaissance."

project may look good when it is complete in the dry season, but may end up underwater when it rains. If available, use surveyors to ensure that the water is draining away from the project. If surveyors are not available, do the best you can with a trained eye.

Train younger Soldiers on as many pieces of equipment as possible on each project. This will affect progress, but it is a good opportunity to cross-train operators on different machinery. Most of them will be noncommissioned officers on their next deployment, and this is the time to get them the training and proficiency they need for promotion. Before the mission starts (and before the reconnaissance, if possible), make sure to get a clearly defined scope of work. Customers frequently asked for additional work once a project was started. If the requested job was small, and we were capable of doing it with our equipment, we would oblige them. But remember that your battalion assigned specific work and that there are more missions waiting after completion of the current job.

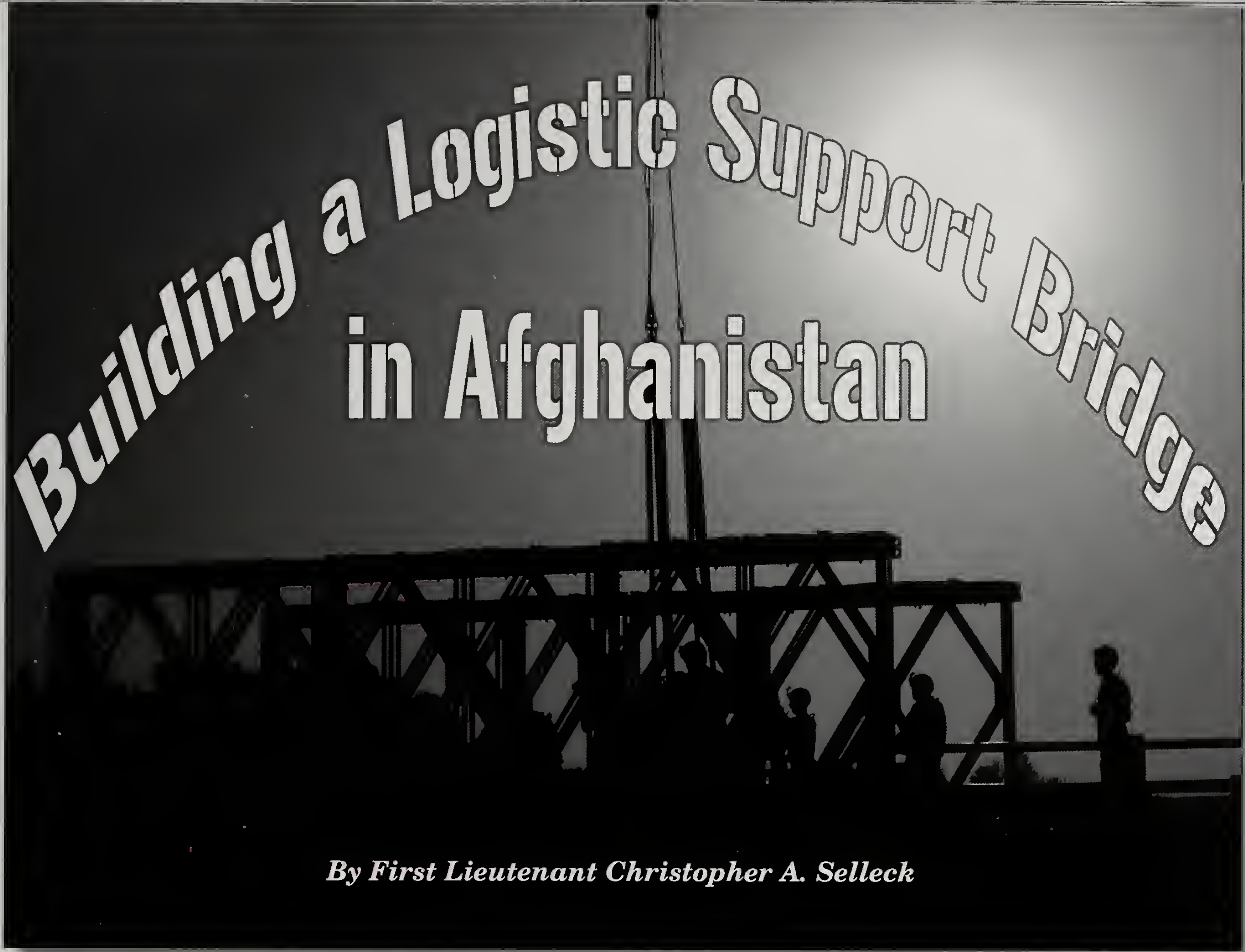
Following are lessons learned from specific missions:

- In building an earthen road to Class B standards, we learned that the most important factor is the availability and application of water. Without water, there is no compaction and the road will not hold up. If there is not a large, renewable water source nearby, it might be necessary to locate and convoy to one. This might not be practical and will inevitably draw out your timeline. Technically, this is a "make-or-break" issue for the project. During the middle of winter, working 24 hours a day, we used approximately 30,000 gallons of water a day for a month. We estimated that to construct the same road in the middle of the summer, with its heat and evaporation, would take approximately 60,000 gallons a day. Also, for best results, surveyors should be on-site the day the project starts and for as many additional days as possible. Ensure that the surveyors do not emplace center-line grade stakes until near the end of the project. It is difficult for the Soldiers to operate big equipment around the stakes, and in the end, the stakes are knocked out anyway.
- Having a mechanic on-site was important, because he constantly worked to keep the mission on schedule. He fixed the water distributor four or five times and used parts from one scraper to keep another working. During the project, several pieces of equipment broke down. Extra parts and equipment should be on standby, ready to push out to the jobsite. After completing the project, ensure that the customer understands that no matter how well-built the road is, it will need maintenance. Rain and high-speed traffic wear the road surface down quickly.
- Reconnaissance is paramount for rapid crater repair (RCR) missions. Pictures and dimensions reported by the operational environment owner may fail to convey the true scope of the work required. If cement is used for an RCR mission, it should contain accelerant. Otherwise, Soldiers may have to wait at each hole for hours while cement sets.
- Missions that require spending weeks in a desolate location can be improved by taking along some items that will improve the quality of life. We spent approximately 45 days in the blistering heat of an Iraqi summer, living in the middle of an agricultural field while we built a joint combat outpost. One of the biggest morale boosters the unit had was a refrigerator van that let us keep ice on hand. Cold drinks and ice are invaluable in this type of environment and made life much more bearable.
- Try to get some unified ground rations express (UGRE) before starting the mission. UGRE are self-heating, three-course meals that serve 12 Soldiers or more and are much tastier than meals, ready-to-eat. Packages of chips, fruit juice, Gatorade®, and other snack items from the dining facility help to break the monotony of eating the same food day after day.
- Bring along anything that can provide shade, since the sun will drain everyone's energy, and Soldiers will welcome a cooler place out of the sun to rest. Of course, working at night when possible allows Soldiers to work longer and reduces the threat of heat injury.

Firsthand knowledge of the worksite before a mission begins, and equipment maintenance when the mission is complete, were two of the major lessons learned during the 561st Engineer Company's deployment. The value of training and simple morale boosters during the mission was another valuable lesson learned. Taking proper care of Soldiers and their equipment is crucial to a successful deployment.

First Lieutenant Hawkins serves with the 561st Engineer Company, 84th Engineer Battalion, which recently returned to Schofield Barracks, Hawaii, from Operation Iraqi Freedom. He holds a bachelor's in environmental engineering.

Building a Logistic Support Bridge in Afghanistan



By First Lieutenant Christopher A. Selleck

In mid-February 2009, the Soldiers of the 4th Engineer Battalion (Combat Effects), deployed from Fort Carson, Colorado, to Baghdad, Iraq, to provide route clearance support for Multinational Division–Baghdad. The battalion, operating from Camp Liberty, received orders within weeks of its arrival to move its efforts to southern Afghanistan to support the influx of U.S. forces heading to the region. As the Soldiers packed up their equipment, leaders at all levels shifted their focus from conducting operations in the highly congested urban streets of Baghdad to the wide-open desert and mountain passes of Afghanistan. Despite the challenges and the new tactics associated with conducting rural route clearance, the Soldiers of the 4th remained optimistic.

In Kandahar, while waiting for the arrival of its route clearance equipment, the battalion was asked to help construct a 150-foot Mabey-Johnson logistic support bridge (LSB) on an overpass that had been damaged by an improvised explosive device (IED). The bridge was located on Highway 1—known as Ring Road—2,100 kilometers of almost completely paved road that encircles Afghanistan and links the roads that lead to its international borders. Because of this, mobility along this road is critical for locals as well as coalition forces. The battalion commander decided to dedicate the Soldiers of the 576th Engineer Company (Mobility Augmentation) to the task.

The advantage of the Mabey-Johnson LSB over the more widely known Bailey bridge is its strong steel deck and transom system. The Mabey-Johnson LSB requires far less material to provide a much higher military load class (MLC). Also, because the overpass was still intact, a crane could be used to construct the entire bridge, as opposed to building a temporary launching nose and rollers and using the cantilever system, a common construction technique for both the Bailey bridge and the Mabey-Johnson LSB.

The 576th Engineer Company primarily consists of combat engineers who have little experience with military bridging beyond the small block of instruction taught in advanced individual training. Thus, the company relied on the expertise of a British Army captain and a Canadian Army warrant officer to guide the construction effort. The company was split into two elements: security and construction. The security platoon escorted vehicles and equipment 161 kilometers to the site, then provided a security cordon for the construction platoon. It also coordinated outer security cordons set by other coalition forces to control traffic. The construction platoon began work at Kandahar Airfield on 5 May, nine days before leaving for the site. The Soldiers were assisted by two coalition crane operators using a German Army crane to reinforce the frame sections of the bridge in order to support the designed MLC and to load the trucks efficiently to reduce construction time.

Afghan workers unload a truck under the eyes of American Soldiers.

The security platoon departed Kandahar Airfield for the bridge on the morning of 14 May. Movement was halted by a mechanical malfunction of the crane, which ended up delaying construction for two days. When the crane arrived at the site on a flatbed trailer, the inner cordon was established and the area was cleared using mine roller equipment and a specialized search dog from the 94th Engineer Detachment, Fort Leonard Wood, Missouri. To maintain an aggressive posture on the site while waiting for the crane to be fixed, the company conducted dismounted patrols of the area. Almost daily enemy IED activity to the west heightened the Soldiers' state of alertness.

On 17 May, a new crane arrived, and the original crane was repaired. This allowed construction to move at a pace quicker than anticipated. The heaviest and most critical piece of the bridge—the near-shore ground beam—was placed first. At nearly 5 tons, it had to be precisely placed and centered or the entire bridge would veer off in the wrong direction. Once it was placed, the tedious process of emplacing 15 bays consisting of panels, transoms, bracing, and decks began. When the new bridging reached the middle of the damaged overpass, construction from both sides was possible. While bays were being added from the far shore, the crane on the near shore helped place decking and the near-shore ramp.

The Soldiers of the 576th worked in shifts around the clock with only a short rest period in order to reduce time on-site. Minor problems called for creative solutions, but no problems arose that halted construction for any length of time. For example, upon completion of the ninth frame, the construction platoon discovered that the bridge was 7 inches off center. Instead of removing frames to correct the problem, the platoon (with help from the crane and several Soldiers from the security platoon) used manpower to slowly move the bridge back on center. The platoon also employed building techniques using vehicle jacks, ratchet straps, and tanker bars to help get the bridge pieces assembled.

The Soldiers completed the bridge on 19 May, with a total construction time of approximately 50 hours. The security and construction platoons, along with the route clearance patrol, moved from the bridge site back to their forward operating base as night was approaching. The next morning, the company began to make its way back to Kandahar. With minimal training, the Soldiers of the 576th Engineer Company dramatically improved mobility and freedom of maneuver along Highway 1, aiding the people of Afghanistan and coalition forces.

First Lieutenant Selleck is the operations officer for the 576th Engineer Company (Mobility Augmentation), 4th Engineer Battalion. Previously, he was a platoon leader with the 576th Engineer Company. He is a graduate of the United States Military Academy at West Point, New York.

Building Civil Capacity in Iraq

By Colonel Scott F. "Rock" Donahue and Major Daniel L. Higgins

> *"Modern man's capacity for destruction is quixotic evidence of humanity's capacity for reconstruction. The powerful technological agents we have unleashed against the environment include many of the agents we require for its reconstruction."*
>
> –*George F. Will*

On 14 February 2008, the United States Army's XVIII Airborne Corps assumed command of Multinational Corps–Iraq (MNC–I) from III Corps. Operation Iraqi Freedom was at a critical turning point, nearing the end of the "surge" of more than 25,000 troops. From April to August 2008, the five surge brigade combat teams (BCTs) departed the Iraqi theater of operations. With improved security and a refined approach to counterinsurgency operations, the new operational environment was characterized by vast economic growth opportunities and an explosive demand for essential services. Against this backdrop, MNC–I focused on deliberate planning and execution of its third line of operation (LOO)—building civil capacity.

The holistic approach to developing civil capacity involved coordinating and synchronizing the capacity-building efforts of multiple stakeholders, including coalition forces, provincial reconstruction teams (PRTs); international organizations; and most important, local, provincial, and national Iraqi government agencies. This article documents MNC–I's processes, best practices, and lessons learned in coordinating the joint, interagency, intergovernmental, and multinational initiatives necessary to successfully transition civil capacity development to a capable Iraqi government with support from PRTs and international organizations.

Evolution of Nonlethal Effects

> *"An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage."*
>
> –*Jack Welch*

From 2007 to 2008, improved security significantly increased public expectations for government-provided services. In May 2008, XVIII Airborne Corps envisioned a conceptual framework for civil capacity development and transition in Iraq as depicted in Figure 1. XVIII Airborne Corps and its subordinate units played a key role in providing minimum essential services such as sewer, water, electricity, trash disposal, refined fuel products, and health care to the Iraqi population while the Iraqi government steadily developed its own capability, enabled by U.S. government agencies, international organizations, and nongovernmental organizations (NGOs).

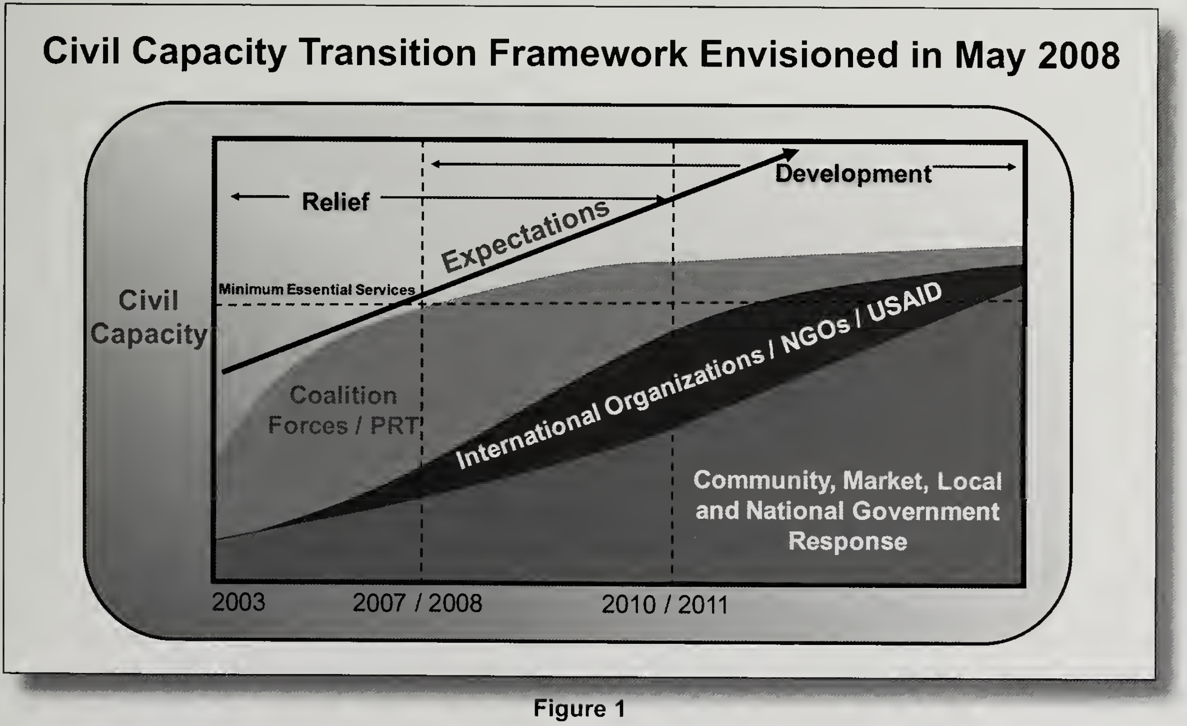

Civil Capacity Transition Framework Envisioned in May 2008
Relief
Development
Expectations
Minimum Essential Services
Civil Capacity
Coalition Forces / PRT
International Organizations / NGOs / USAID
Community, Market, Local and National Government Response
2003
2007 / 2008
2010 / 2011

Figure 1

MNC–I was made acutely aware of this shift on 26 June 2008, when a Multinational Force–West (MNF–W) weekly situation report articulated the need for a comprehensive, fully integrated approach to achieve lethal and nonlethal effects in Anbar Province. The approach would require tactical- to strategic-level key leader engagement with the Iraqi government. Coordination and planning for nonlethal effects at this stage of the campaign were primarily synchronized by the soft-power joint planning team (JPT) led by MNC–I's engineer staff section (C7) and consisting of elements from the following organizations:

- Future operations (FUOPS [C35])
- C7 Infrastructure Protection and Reconstruction section
- Staff Judge Advocate (SJA)
- Civil affairs (C9), Economics and Governance section
- MNC–I surgeon
- Others

The June MNF–W situation report reinforced the need for an MNC–I civil capacity champion—a corps-level lead—to provide a broader, deeper approach to integrating civil capacity with lethal operations aimed at achieving sustainable security and developing Iraqi Security Force (ISF) capability.

On 1 July 2008, the soft-power JPT convened to address the issues raised by MNF–W. Concurrently, MNC–I senior leaders and staff principals collaborated to formalize a more robust and enduring approach to synchronizing civil capacity initiatives. Complexity frustrated this process as the civil capacity LOO consisted of four prioritized objectives involving three primary staff sections:

- Transparent and accountable governance (C9)
- Sustainable economic development (C9)
- Provision of essential services (C7)
- Firmly established rule of law (SJA)

The operational objective of the civil capacity LOO focused on effectively executing tasks required by these four discreet objectives to reinforce security gains and legitimize the Iraqi government.

July 2008 involved several planning iterations to integrate and synchronize civil capacity within the XVIII Airborne Corps planning cycle, since the best approach had yet to be determined. This process ran parallel with the soft-power JPT mission analysis and course of action (COA) development for Anbar civil capacity integration (CCI). To adequately plan for robust Anbar CCI, the soft-power JPT expanded to a larger, more permanent group called the Civil Capacity Integration Team (CCIT), led by the director of MNC–I C7. The group received planning guidance and direct oversight from the MNC–I deputy commanding general (DCG) and the DCG for Coalition and Infrastructure. Tasks for the CCIT were—

- Exploit security gains through the civil capacity LOO.
- Synchronize nonlethal enablers to complement lethal operations.
- Conduct nonlethal targeting by incorporating nonlethal enablers in support of operational priorities.

Sensing a need for a more permanent staff section principally dedicated to the nonlethal portion of the campaign, the MNC–I chief of staff and the operations (C3) section formed a nondoctrinal staff section called C3 Nonkinetic (nonlethal) FUOPS, or C35 NK. This emerging organization was manned by permanently assigned officers from MNC–I coordinating and special staff sections and major subordinate commands already involved in civil capacity development. These were primarily the C9, C7, SJA, and 304th Civil Affairs Brigade. The C35 NK mission was to coordinate and synchronize MNC–I's nonlethal enablers according to the priorities of the MNC–I commander to—

- Exploit security gains.
- Deny resurgence of violent extremists.
- Build civil capacity.
- Advance sustainable security in Iraq.

C35 NK was formally established on 28 July 2008 and was staffed as shown in Figure 2, page 54. With a clear mission and an increasingly important LOO to synchronize and integrate, C35 NK set out to facilitate civil capacity planning in support of MNC–I's named operations.

Making the Civil Capacity Mission Operational

"I must study politics and war that my sons may have the liberty to study mathematics and philosophy."

–John Adams

Designed to plan nonlethal operations in parallel with the XVIII Airborne Corps FUOPS section, C35 NK spent its first few months establishing a niche within the existing corps staff framework and operational battle rhythm. Immediate effort went into developing civil-military operations plans for execution during post-lethal operations in the northern Tigris and Diyala River Valleys in support of Operation Glad Tidings of Benevolence (GTOB). August through October 2008 was a challenging period as C35 NK endured the uncertainty of organizational change. Planning efforts for the northern Tigris and Diyala River Valleys failed to gain widespread acceptance at the division level, where subordinate commanders and staff were skeptical of infusing higher-level follow-on nonlethal direct support into previously planned division operations. Nevertheless, MNC–I and its subordinate commands steadily made nonlethal gains, although C35 NK's role was somewhat limited. Eventually, C35 NK's functions transformed from purely planning to synchronizing efforts in support of the civil capacity LOO.

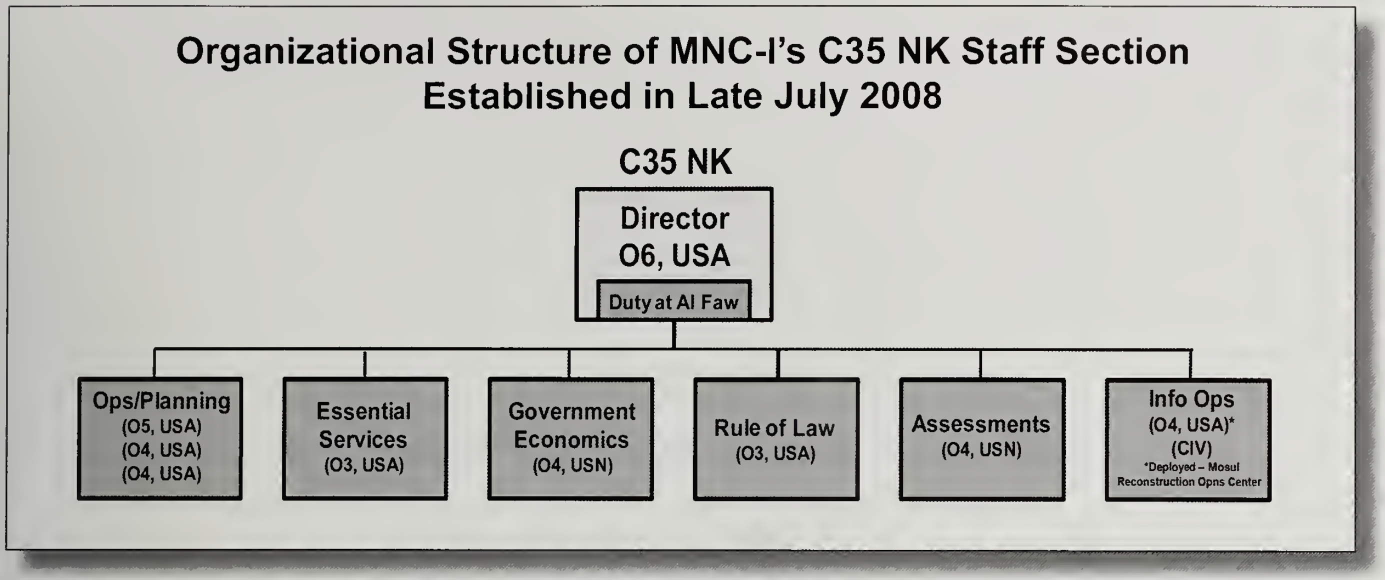


Figure 2

In its refined role, C35 NK provided responsive staff support to MNC–I senior leadership, coordination and synchronization to MNC–I primary staff sections responsible for lethal operations, and coordinating support to interagency partners. Integration of nonlethal effects during and after lethal operations was fundamental to the success of MNC–I's counterinsurgency operations. This was particularly true as the ISF increasingly took the lead in lethal operations, although they hadn't thoroughly developed nonlethal aspects to complement these operations. Civil capacity projects, through the Commanders Emergency Response Program (CERP) and the Iraqi Commanders Emergency Response Program (I-CERP), achieved success in Diyala Province during Operation GTOB. These programs improved the delivery of essential services and changed the perspective of Iraqi citizens about the top problems in their neighborhoods.

Operation GTOB was the first major combined operation collaboratively developed by MNC–I and Iraqi Ground Force Command planners. The operation revealed the increased demand for essential services once security was established. It also provided a number of nonlethal lessons learned for inclusion in future operations to achieve sustainable security.

Refining for Success: Synchronizing Civil Capacity Stakeholders and Partners

"Plans are only good intentions unless they immediately degenerate into hard work."

– Peter Drucker

As the Iraq campaign continued to unfold during the summer and fall of 2008, MNC–I started planning a new operations order (OPORD) to accommodate the rapidly changing operating environment. The civil capacity working group assembled in late August and began mission analysis. Several key factors influenced the planning process for the civil capacity LOO. The most compelling change was the expiration of United Nations Security Council Resolution 1754 on 31 December 2008. The new MNC–I OPORD would require coalition forces to work by, with, and through ISF and a sovereign Iraqi government under an emerging yet undefined security arrangement.

Securing the Iraqi population and training and equipping the ISF remained MNC–I's priority, but building civil capacity was steadily increasing in importance. Demand for services continued as security gains allowed displaced persons to return to their homes. Consequently, demand for essential services such as electricity and potable water was outpacing the growing supply. Ultimately, the director of MNC–I C7 assumed ownership of the civil capacity LOO for the development of MNC–I OPORD 09-01. He directed his deputy director for operations, plans, and logistics to lead the civil capacity JPT. The team quickly discovered that there was no standard definition of "civil capacity." An exhaustive search of Army field manuals (FMs), joint publications, and numerous references confirmed this assessment. Consolidating inputs from all of these sources, the team eventually developed a definition that the MNC–I commander ultimately approved:

Transparent and accountable Iraqi provincial and local governments providing essential services to their citizens, and characterized by a firmly established rule of law and sustainable, growing economy.

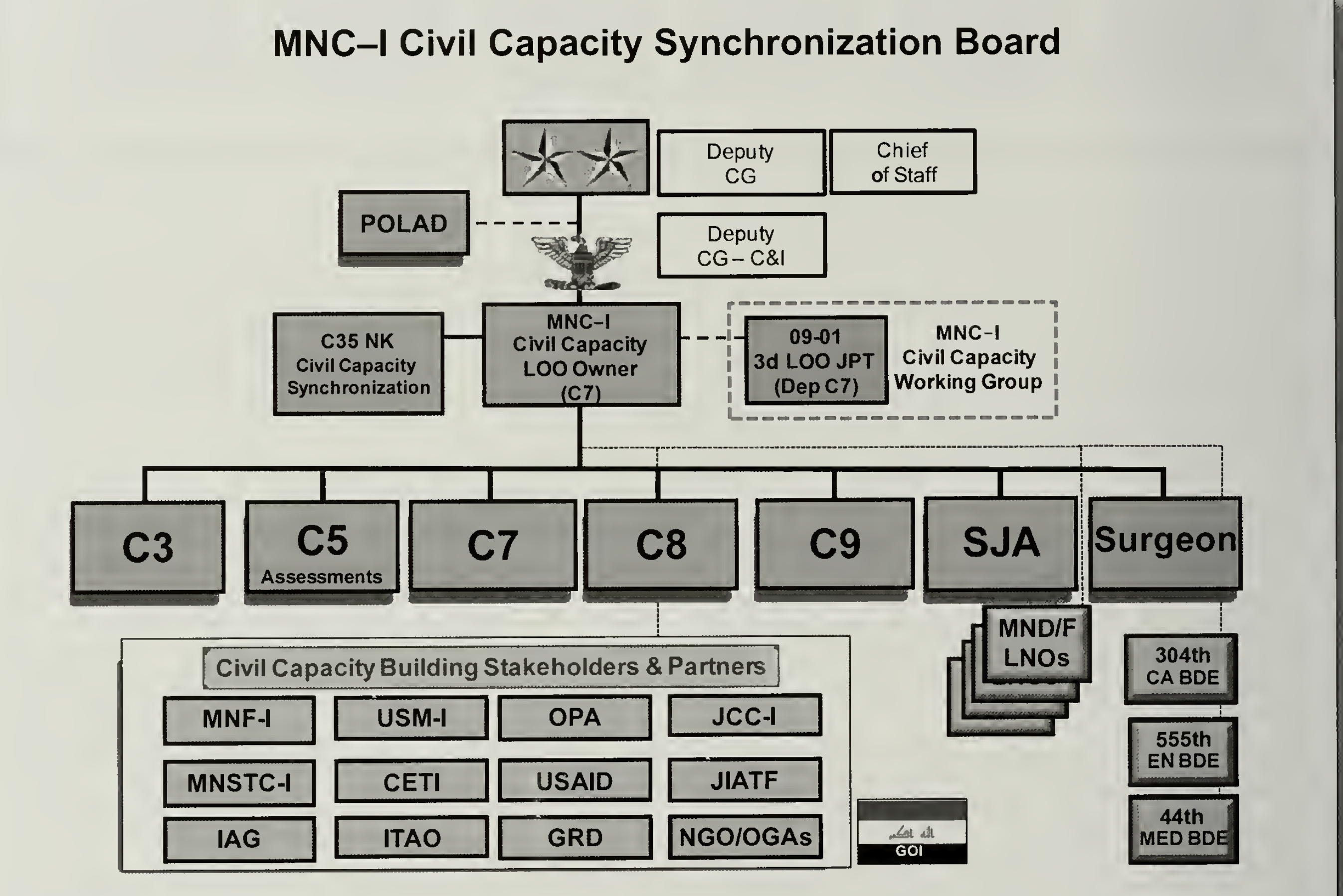
That definition was derived from the—

- Joint campaign plan.
- Strategic framework.
- Draft unified common plan.
- FM 3-24, *Counterinsurgency.*
- FM 3-07, *Stability Operations.*

The experienced team rapidly assimilated lessons learned during previous planning efforts which helped shape the mission analysis and COA development for MNC–I OPORD 09-01. Throughout September and October 2008, the JPT met three times per week to develop the MNC–I civil capacity strategy. The planning effort also included key partners from the Office of Provincial Affairs (OPA) and the United States Agency for International Development (USAID). These team members provided invaluable insight from the Department of State (DOS) perspective, assuring DOS and PRT objectives were fully integrated.

The MNC–I commander approved the recommended COA for the civil capacity LOO on 8 November 2008. The LOO consisted of four objectives linked to, and nested with, OPA's five lines of action and Multinational Force–Iraq's (MNF–I's) five LOOs in the joint campaign plan. These objectives were similar to MNC–I's OPORD 08-02 objectives but were refined to reflect two key factors:

- The DOS would be the supported agency for civil capacity development in Iraq.
- Coalition force capacity-building efforts would focus on cementing the security gains made to date.


MNC–I Civil Capacity Synchronization Board

Legend:

Bde	brigade
C5	plans
C8	resource management
C9	civil affairs
C&I	coalition and infrastructure
CA	civil affairs
CETI	Coordinator for Economic Transition in Iraq
CG	commanding general
Dep	deputy
EN	engineer
GOI	government of Iraq
GRD	Gulf Region Division, United States Army Corps of Engineers
IAG	Iraq Assistance Group
ITAO	Iraq Transition Assistance Office
JIATF	joint interagency task force
JCC–I	Joint Contracting Command–Iraq
LNO	liaison officer
MED	medical
MND/F	Multinational Division/Force
OGA	other government agencies
OPA	Office of Provincial Affairs
POLAD	political advisor
USM–I	United States Mission–Iraq

Figure 3

Concurrent with MNC–I OPORD 09-01 planning, the MNC–I civil capacity LOO senior leadership introduced a new idea for a synchronization forum, which became known as the Civil Capacity Synchronization Board (CCSB), chaired by the MNC–I DCG and facilitated by the MNC–I DCG for Coalition and Infrastructure. The intent was to augment the existing corps planning framework and support the C7 civil capacity LOO owner by providing general officer guidance and a single forum for all stakeholders to present initiatives in support of the multinational divisions (MNDs). The MNC–I commanding general approved the concept and the CCSB convened for the first time on 4 November 2008. The forum immediately proved invaluable in providing guidance for executing MNC–I's civil capacity LOO, as well as ensuring the coordination and synchronization of DOS partners. The CCSB ultimately evolved into the premier venue for MNC–I civil capacity integration with major subordinate commands, the United States embassy, MNF-I, OPA, and international organizations such as the United Nations Assistance Mission–Iraq. Figure 3 depicts the organizational structure of the CCSB and lists the participating stakeholders.

"MNC–I focused on deliberate planning and execution of its third line of operation—building civil capacity."

The final coordination mechanism to codify civil capacity development initiatives was formalizing the relationship at the operational level between OPA and MNC–I. At the strategic level, MNF–I was guided by the joint campaign plan and strategic framework agreement with the U.S. embassy. The strategic framework agreement also established a coordinator for economic transition in Iraq and directed the development of unified common plans at the MNC–I and MND levels. At the tactical level, MNDs and BCTs developed joint campaign plans with their paired PRTs, but no formal operational-level arrangement existed between MNC–I and OPA.

In late November 2008, a new JPT formed with OPA to draft a unified common plan amenable to both organizations and to formalize the support MNC–I would provide OPA as lead U.S. government agency for civil capacity development in Iraq. It also defined the mechanisms to coordinate planning and to eliminate conflicts in the employment of U.S. resources. Ultimately, the objective was to provide unity of effort across DOS and DOD entities at the operational level. Furthermore, the unified common plan sought to provide a civil capacity common operating picture, shared expectations, synchronized guidance, and prioritized U.S. resources. It also refined the process for subordinate unit plans—MNDs/PRTs and battlefield owners/embedded PRTs—by defining a new provincial unified common plan framework and coordinating guidance. The plans generated by the PRTs as part of this process were coordinated and synchronized across the theater of operations by DOS and DOD elements alike.

Civil Capacity Handover to I Corps

"Our job is not to build it for them; our job is to help them build the capacity so that they can use their own substantial resources to do things for themselves."

–Ambassador Joseph Saloom

In the final analysis, MNC–I's civil capacity-building efforts were remarkably successful. Its successful management of the postsurge security environment enabled the subsequent transition to Iraqi-led security operations as the ISF continued to grow in experience and capability. As of April 2009, attacks and casualties were down to 2003 preinsurgency levels. The ability of Al Qaeda in Iraq to conduct sustained operations was severely degraded. The improved security also enabled MNC–I to focus on stability operations and capacity-building throughout most of the theater of operations. The provincial elections held on 31 January 2009 occurred under Iraqi control without incident, and the process to seat the new provincial governments proceeded as planned.

A closer evaluation of MNC–I's civil capacity objectives confirms this assessment. With respect to improved governance, the successful provincial elections indicated the significant strides made by the Iraqis. Notwithstanding friction points such as Arab-Kurd tensions in the north and the proposed Iraq hydrocarbon law, results to date are noteworthy. Significant improvements in providing essential services during the corps's tenure, particularly in the critically important electrical sector, were also made. As of April 2009, electrical generation was at the highest point in Iraq's history, greater than 125,000 megawatt hours, and there are plans to add an additional 20 percent to the grid by the end of 2010.

Other essential services improved as well, and with PRT and coalition support will transition to capable Iraqi agencies. The rule of law continues to improve throughout Iraq, particularly in judicial security, detention operations, and the investigative capacity to support criminal prosecutions. Additional effort is required to reduce cultural tolerance for corruption, reform business laws, and increase transparency, but Iraqi leadership has expressed a willingness to do all three. Economic activity continues to expand in a number of sectors other than petroleum, which is critical for a broader Iraqi economy. The hospitality and service industries show positive signs in areas supporting religious tourism, and foreign direct investment to improve oil, gas, and electrical sectors appears imminent with a relatively low global price for oil. In summary, from the tactical to strategic levels, MNC–I's full spectrum civil capacity influence set positive conditions for handover to I Corps in April 2009, and for continued civil capacity development as U.S. forces withdraw by the end of 2011.

The primary tools used to facilitate civil capacity initiatives at the tactical level were the CERP and the Iraqi-funded version, I-CERP. These programs facilitated the civil capacity building projects that led to the success previously

(continued on page 59)

Soldiers Run to Remember Fallen Hero

By Sergeant Rebekah Malone

At daybreak on a warm desert morning in Baghdad, nearly 1,000 Soldiers joined together to remember one of their own in a moving tribute. On 5 April 2009, six years after Sergeant First Class Paul Ray Smith of Tampa, Florida, lost his life defending more than 100 troops, Soldiers of the 46th Engineer Battalion (Combat) (Heavy), 225th Engineer Brigade, held a run in honor of his memory.

The run's distance—11.46 kilometers—stood as a tribute to Smith's unit and comrades. The actual battle site served as the starting and ending point for the racers. Casually listening, one could not help overhearing Soldiers use a powerful word to describe their comrade: hero.

A first sergeant who met Smith in 2000 when they served as platoon sergeants of Alpha and Bravo Companies, 11th Engineer Battalion, said that he was impressed by the personal interest Smith took in each of his Soldiers, as evidenced by how all of them had only great things to say about him when he was a platoon sergeant. Specifically, they respected the way he took care to sit down with them and talk to them on a personal basis as well as a professional one.

Photo by Sergeant Rebekah Malone

The watchtower, riddled with bullet holes, is a haunting reminder of the battle that took the platoon sergeant's life.

His fellow platoon sergeant and friend explained that Sergeant First Class Smith lived the Army Values daily and could be described as "an awesome fellow noncommissioned officer" who went out of his way to take care of his Soldiers

Photo by Staff Sergeant Bradley West

Photo by Sergeant Rebekah Malone

A participant of the Sergeant First Class Paul Ray Smith Memorial Run wears a shirt that displays the photo of the fallen hero.

on and off duty. His friend arrived at the 4 April 2003 battle after Smith had been mortally wounded, to assist in securing the area. Smith had manned a .50-caliber machine gun atop a damaged armored personnel carrier after the gunner was wounded, effectively killing 25–50 enemy combatants of the estimated 100 attacking the courtyard by the highway between Baghdad International Airport and Baghdad itself.

Sergeant First Class Smith's actions deescalated the attack and saved reportedly up to 100 Soldiers. What remains are the bullet holes in the watchtower and the memory of a Soldier who stood for other Soldiers, including the more than 4,200 servicemembers who have died during Operation Iraqi Freedom. Smith's fellow platoon sergeant and friend was amazed after five years at how much this area had changed with the buildup of troops; he wanted to find the area where the engagement took place and see if anyone had done a memorial. He discovered that there was nothing there. Until now . . . .

On the sixth anniversary of his death and in honor of the fallen hero, Soldiers placed a memorial marker on the concrete wall—riddled with bullet holes—which he had defended during the fight. It is a fitting tribute for Sergeant First Class Paul Ray Smith for what he did in this place for his country and its warriors.

Sergeant Malone, a member of the Louisiana National Guard's 225th Engineer Brigade, is a unit public affairs representative in Iraq. A graduate of Pratt Community College, she will soon complete a Bachelor of Arts in Liberal Studies from Louisiana State University in Alexandria.

Note: On 4 April 2005, Sergeant First Class Paul Ray Smith was posthumously awarded the first Medal of Honor for actions in support of Operation Iraqi Freedom. He was the 14th engineer to receive the military's highest award.

("Civil Capacity," continued from page 56)

described. Iraqi answers to polling questions about their top local concerns revealed a sense of normalcy that improved greatly from February 2008 to February 2009. Employment, rather than security, was the most important issue by a wide margin. Improving a diversified economy and providing jobs will be critical tasks as Iraq moves forward in 2009 and beyond.

To successfully move forward, MNC–I will continue to build on civil capacity best practices and the following key lessons learned:

- Ensure that nonlethal planning is fully integrated with lethal operations.
- Keep civil capacity projects small while security is tenuous and gradually transition to larger programs as conditions permit.
- Ensure that interagency planning and coordination are conducted from strategic to tactical levels.
- Coordinate with interagency partners to develop and maintain a civil capacity common operating picture.
- Expect explosive demand for essential services as soon as security is achieved.
- Prevent loss of momentum by ensuring a thorough civil capacity handover during and throughout transitions.

The final chapters in Operation Iraqi Freedom will be written over the next 24 months. Achieving sustainable security and transitioning the civil capacity mission to fully capable Iraqi government agencies will depend heavily on efforts to train Iraqi officials and continue building on the foundations laid in part by MNC–I during Operation Iraqi Freedom 07-09. Improving security is the catalyst for continued gains, and with the assistance of the U.S. embassy, coalition forces, international organizations, foreign corporations, and Iraqis helping Iraqis, Iraq will remain free and flourish as the liberated democratic nation we set out to create.

Colonel Donahue served as the XVIII Airborne Corps engineer and Director, MNC–I C7 from February 2008 through April 2009. He was responsible for coordinating, synchronizing, and executing full spectrum engineer support for coalition forces throughout the Iraqi Theater of Operations. He holds a bachelor's in civil engineering from the Virginia Military Institute, a master's in operations research from the Naval Postgraduate School, and a master's in strategic studies from the United States Army War College. He is also a registered professional engineer in Virginia.

Major Higgins, United States Army Reserve, is Deputy Commander, 733d Facility Engineer Detachment, based in Fort Leavenworth, Kansas, and served on the MNC–I C7 Infrastructure Protection and Reconstruction staff from September 2008 through July 2009 during Operation Iraqi Freedom. He was the lead corps planner for the "Provision of Essential Services" objective implemented on 1 January 2009 and a contributor to the unified common plan between MNC–I and OPA. He holds a bachelor's in civil engineering from the United States Military Academy and a master's from the Helzberg School of Management at Rockhurst University.

Photo by Captain James Reid

JOINT ENGINEER—

A MULTINATIONAL PERSPECTIVE

By Major Jared L. Ware

The Multinational Security Transition Command–Iraq (MNSTC–I), a subordinate command of Multinational Force–Iraq (MNF–I), is responsible for the construction of facilities for Iraqi Security Forces (ISF) within the Ministry of Defense (MOD), Ministry of Interior (MOI), and Counter Terrorism Bureau (CTB). This includes facilities for the generation of forces, as well as permanent basing for operational units. Within MNSTC–I, the Joint Engineering Directorate (J7) is the primary directorate for planning, executing, and transferring engineer facilities missions in support of the ISF. The J7 coordinates vertically and horizontally with the various coalition staffs, the United States Air Force Center of Excellence for the Environment, the United States Army Corps of Engineers–Gulf Region Division (USACE–GRD), and its Iraqi counterparts within MOD, MOI, and CTB, to ensure a cradle-to-grave engineering process. The purpose of this article is to outline how the MNSTC–I J7 is currently structured to meet requirements, and how the organization is transforming to meet new requirements for 2009.

Structure

The J7 is a joint staff consisting of officers and noncommissioned officers (NCOs) from each of the Services, as well as Department of Defense civilians and contractors. The sole function of the staff is civil engineering, and it does not focus on full spectrum engineering functions such as combat or geospatial. The J7 is organized into the following basic sections:

- MOD construction
- MOI construction
- Construction development cell (CDC)

The MOD and MOI sections derive requirements from the various stakeholders and assign program and project managers to each construction effort. For example, if the Coalition Army Advisor Transition Team (CAATT) defines a requirement for an Iraqi division training facility in central Iraq, then the J7 MOD section leader will assign a program manager and project engineer to the mission.

The program manager helps CAATT define the scope of work and a rough order-of-magnitude cost estimate. The program manager also works with the CDC to prepare a more detailed estimate for the overall cost of the facilities requirement. The program manager and CDC also work with the contracting agency, usually Joint Contracting Command–Iraq or USACE–GRD, to award the case. Also, the J7 hosts the technical evaluation board to ensure that the bidding contractors meet the minimum criteria for the overall design and building of the project. Once the project is awarded, the J7 program manager interacts with all stakeholders to ensure that the project is meeting the statement of work criteria, the projected timeline, and the projected budget. Normally, the source of funding is ISF funding (ISFF), but there are ongoing projects funded through the Security Assistance Office's Foreign Military Sales (FMS) program for construction. Once the project is completed, the J7 works with the MOD's director general for infrastructure or the MOI's director general for construction to transfer the completed property to the Iraqi government. The process is a total cradle-to-grave process that covers the joint, interagency, intergovernmental and multinational (JIIM) gamut.

Transformation

In 2008, the J7 executed more than 300 ISFF projects from within the MOD and MOI sections at an estimated cost of more than $1 billion. These projects ranged from United States Army shoot houses, United States Air Force dormitories, United States Navy seawalls, Iraqi police stations, and local facilities upgrades. However, the directorate recognized that the MNSTC–I mission, as well as the source of construction funding, was changing. This required the directorate to conduct an in-depth study of the new mission sets and transform its existing joint manning document. The result was an organization that kept the basic construction engineering capabilities but also focused on joint planning and base management. There are various operational planning teams within the MNSTC–I staff that support operational order development, joint campaign planning, and joint basing. The J7 recognized the importance of these teams and of "plugging in" early to the efforts, since most had specific engineering requirements above and beyond the expertise of staff planners in the other directorates. The J7 has now developed a small planning section assigned to conduct all planning functions, to include preaward construction planning. The section also manages the FMS construction mission, currently consisting of several projects valued at approximately $800 million, plus potential projects valued at approximately $400 million.

Another change in the structure is the combination of the MOD and MOI sections into one execution section. As the source of funding transitions from coalition-funded ISFF to Iraqi-funded FMS, there are fewer program management and project management requirements on the horizon. Moreover, there is a growing requirement to improve the engineering competencies at the ministerial levels as the government of Iraq takes on its own engineering programs and projects. The execution section will continue to provide oversight of engineering projects, but take on an additional role as the "right-seat ride" lead as the section interacts with its Iraqi counterparts. Finally, the J7 is developing a base management section that focuses on project transfer and follow-on facilities engineering. In the past, ISF-funded projects were transferred to the government of Iraq, but little future sustainment funding was programmed within the MOD or MOI to provide maintenance and upkeep to the new facilities. The goal of the base management section is to develop processes to facilitate the transfer of facilities, as well as prepare Iraqi facility engineers to properly plan, program, budget, and execute the base management and facilities engineering missions for their respective facilities.

Recommendations

These recommendations are based solely on personal observations, and are focused primarily on the United States Army's Engineer Regiment.

Education and Experience. Given the civil engineering nature of the J7 Engineering Directorate, it is advisable that all incoming personnel possess an engineering or hard science degree, preferably a master's in an applicable discipline. Most of the stakeholders are degreed engineers, and it is difficult to hit the ground running in the assignment without an engineering background, to include an understanding of the facilities engineering and contracting processes. It is also advisable to have engineers attend the Joint Engineer Operations Course before an assignment to MNSTC–I.

Capturing Credentials. A method should be established to capture and document engineering and technical credentials for officers and NCOs. Completing Defense Acquisition Workforce Improvement Act facilities engineering courses, program management professional certification, or managing a multimillion dollar construction project are not formally documented within the human resources system, unless they are stated on a Soldier's efficiency report. The proposed change could help track the development of technical skills required for progressive assignments within the Engineer Regiment.

Directorate Leadership. The past two directors and the incoming director are all from the Navy Civil Engineer Corps community. Over time, the procedures and processes seem to have changed from a truly joint engineering doctrine to one with a Naval Facilities Engineering Command flavor. This has future implications, since most of the MOD facilities are for the Iraqi army. In the future, the directorship should perhaps be rotated among the various services, preferably with senior officers who have previous joint engineering experience.

Conclusion

The purpose of this article was to provide an understanding of the MNSTC–I J7 Engineering Directorate, and explain how the structure is adapting to the changing operational environment within Iraq. As the mission changes from one primarily focused on construction engineering for MOD and MOI to one focused on preparing the Iraqis to conduct engineering missions within their own organizations, the MNSTC–I J7 Engineering Directorate stands ready to meet the future challenges of joint engineering within Iraq.

Major Ware is a joint plans officer and the program manager for foreign military sales construction, MNSTC–I J7 Engineering Directorate, Phoenix Base, Iraq. He has served in a variety of combat, general, and geospatial engineering assignments in the continental United States and overseas. His e-mail address is <jared.ware@us.army.mil>.

Understanding the Army Environmental Structure

By Ms. Martha M. Miller and Ms. Laura Carney

There are several organizations in the Army with specific environmental missions: regional environmental offices (REOs), the Army Environmental Policy Institute (AEPI), the Environmental Law Division, the United States Army Center for Health Promotion and Preventive Medicine (USACHPPM), the United States Army Corps of Engineers (USACE), the United States Army Engineer School (USAES), the United States Army Environmental Division (Department of the Army's Assistant Chief of Staff for Installation Management–Installation Services Environmental [DAIM–ISE]), and the United States Army Environmental Command (USAEC). It's important to understand the differences between each organization's specific mission so that inquiries and requests for information can be properly directed to get expedient responses and assistance to ensure the health of Soldiers while also accomplishing the mission. (For the entire organizational structure of the Army's environmental agencies, see chart, page 63.)

Organizations and Missions

REOs and AEPI

The REOs and the AEPI fall under the Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health. The Army's Strategy for the Environment sets forth the triple bottom line of sustainability—mission, environment, and community. REOs work to reach this bottom line by opening lines of communication, coordinating efforts, and facilitating solutions to ensure the readiness of the Army and the well-being of people and the environment. REOs are regionally based teams focused on helping the Army and its installations rapidly respond to and resolve environmental issues that might adversely affect operations. They conduct important legislative and regulatory monitoring and outreach activities within their regions. They work with military leaders, legislators, and regulators to ensure that the military can conduct training and operations while complying with environmental regulations. They coordinate regionwide environmental issues; review, analyze, and comment on proposed and existing state legislation and regulations; facilitate partnerships with states, tribes, and other federal agencies; communicate Army and Department of Defense (DOD) positions; share ideas and innovations; leverage regional, state, and local environmental management resources; and serve as Army and DOD experts for environmental regulatory and legislative issues in their regions.

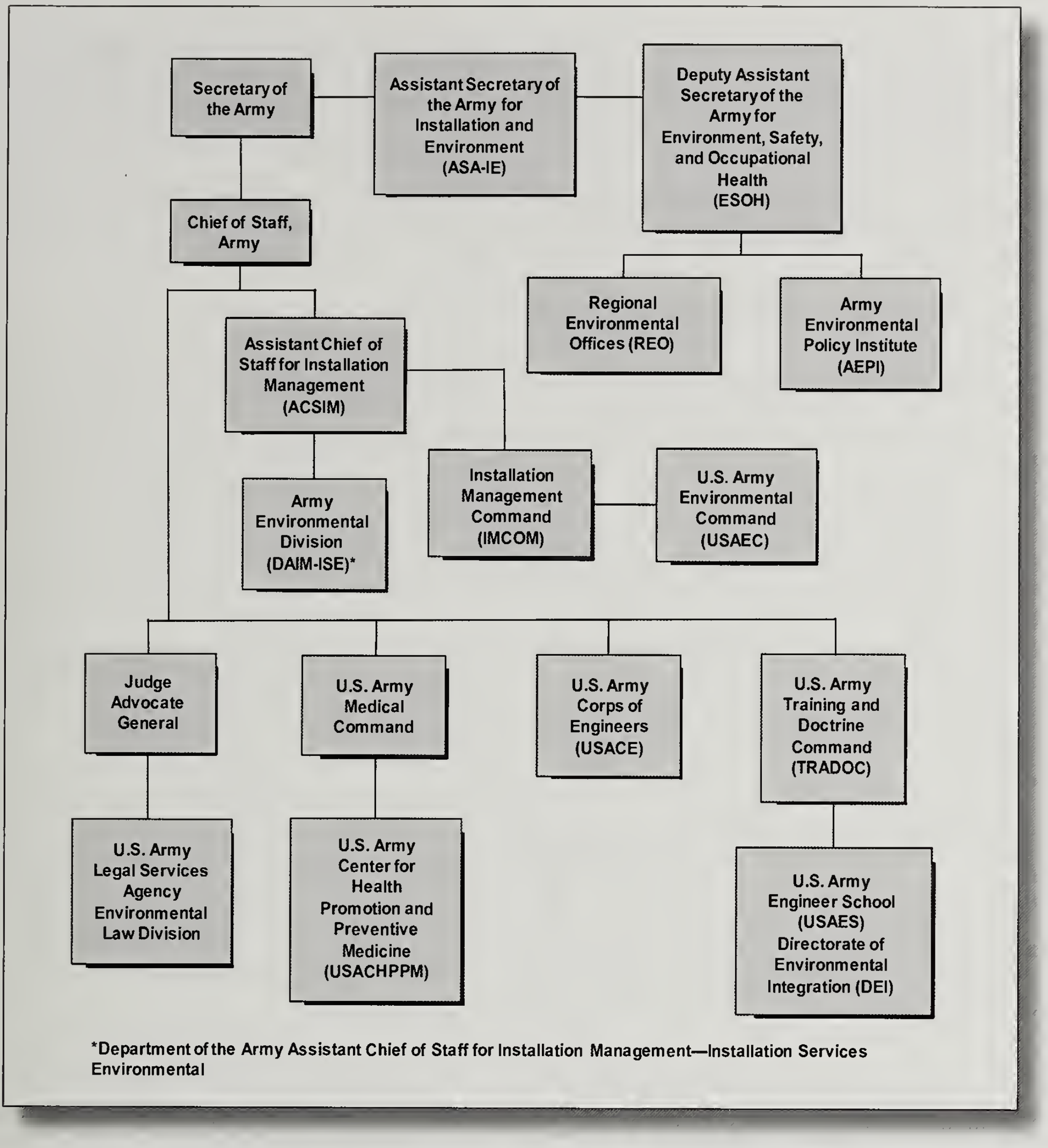
AEPI conducts studies of emerging and existing environmental issues that may significantly impact the Army, then helps develop proactive policies and strategies that affect the sustainment of Army installations and operations. This is a persistent process because environmental issues continually emerge as awareness and technology progress. AEPI's responsibility is to inform the Army secretariat about environmental challenges and opportunities that affect the Army. Its initiatives help the Army sustain readiness, improve quality of life, strengthen community relationships, and reduce total costs of ownership by suggesting sound environmental investments for force transformation and installation sustainability.

Environmental Law Division

The Environmental Law Division, as part of the United States Army Legal Services Agency, provides commanders and their staffs with accurate and proactive legal advice—and representation when necessary—on all environmental compliance issues affecting the Army.

USACHPPM

As part of the United States Army Medical Command, USACHPPM provides worldwide technical support for implementing preventive medicine, public health, health promotion and wellness services, and environmental health and environmental quality programs


Secretary of the Army
Assistant Secretary of the Army for Installation and Environment (ASA-IE)
Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health (ESOH)
Chief of Staff, Army
Regional Environmental Offices (REO)
Army Environmental Policy Institute (AEPI)
Assistant Chief of Staff for Installation Management (ACSIM)
Army Environmental Division (DAIM-ISE)*
Installation Management Command (IMCOM)
U.S. Army Environmental Command (USAEC)
Judge Advocate General
U.S. Army Medical Command
U.S. Army Corps of Engineers (USACE)
U.S. Army Training and Doctrine Command (TRADOC)
U.S. Army Legal Services Agency Environmental Law Division
U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)
U.S. Army Engineer School (USAES) Directorate of Environmental Integration (DEI)

*Department of the Army Assistant Chief of Staff for Installation Management—Installation Services Environmental

for all aspects of the Army and the Army community. It anticipates and rapidly responds to operational needs and remains adaptable to a changing world environment. Its primary focus is to—

- Prevent and control diseases and injuries of military significance.
- Promote health and well-being in military populations.
- Anticipate, identify, assess, and control occupational and environmental health hazards.
- Control advanced and sustainment preventive medicine training.
- Provide targeted health information.

The USACHPPM team is key to the medical support of combat forces and the military managed-care system. It provides worldwide scientific expertise and services in clinical and field preventive medicine, environmental and occupational health, health promotion and wellness, epidemiology and disease surveillance, toxicology, and related laboratory sciences. It supports readiness by keeping Soldiers fit to fight, while promoting wellness among their families and the federal civilian workforce. USACHPPM supports all Soldiers and federal civilian employees, regardless of their branch of Service.

USACE

USACE provides vital public engineering services in peace and war to strengthen the nation's security, energize the economy, and reduce risks of disasters. Its Military Programs Environmental Division manages, designs, and executes a full range of cleanup and protection activities; complies with federal, state, and local environmental laws and regulations; minimizes use of hazardous materials; and conserves natural and cultural resources. The division supports strategic integration such as Base Realignment and Closure, the Gulf Region integration and security assistance, military construction transformation, and stability and reconstruction operations.

USACE has a civil works environmental mission to ensure that all its projects, facilities, and associated lands meet environmental standards. It supports military construction and demolition projects; provides environmental, real estate, international, and interagency services; and provides support for installations and contingency operations.

The Engineer Research and Development Center (ERDC) comprises the following regional research facilities within USACE:

- Coastal and Hydraulics Laboratory, Vicksburg, Mississippi
- Environmental Laboratory, Vicksburg, Mississippi
- Geotechnical and Structures Laboratory, Vicksburg, Mississippi
- Information Technology Laboratory, Vicksburg, Mississippi
- Construction Engineering Research Laboratory, Champaign, Illinois
- Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire
- Geospatial Research and Engineering Center (previously the Topographic Engineering Center), Alexandria, Virginia

These laboratories synergistically address research and development (R&D) in four major areas:

- Military engineering
- Geospatial research and engineering
- Environmental quality for installations
- Civil works or water resources

ERDC is one of the most diverse engineering and scientific research organizations in the world. It conducts R&D in support of the Soldier, military installations, USACE civil works mission, other federal agencies, state and municipal authorities, and American industry. ERDC R&D focuses on five primary technical areas to support the Army and USACE:

- Warfighter support with geospatial information, system development, operational support, force protection, and force projection and sustainment
- Transformation, operation, and environmental issues of installations
- Environmental remediation and restoration, land planning, stewardship and management, threatened and endangered species, and cultural resources
- Water resources and infrastructure, environmental issues, navigation, flood control, and storm damage reduction
- Information technology, informatics, geospatial technologies, computational services, and high-performance computing applications

Integrated teams of engineers and scientists within ERDC can address a wide range of scientific and technological issues. Some issues previously addressed are the effects of arctic temperatures, vehicle mobility in desert sands, the protection of wetlands, the pinpointing of exact locations of unexploded ordnance, the prediction of habitat ranges for endangered species, and most important, the protection of Soldiers in various conditions.

USAES

Under the United States Army Training and Doctrine Command, the USAES commandant is one of the senior leaders within the Army environmental community, serving as the proponent for the development and integration of environmental considerations across the domains of military operations and doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). With this mission, USAES developed the Army Environmental Integration Plan and formed the Directorate of Environmental Integration (DEI).

The mission of DEI is to fully implement the Army Environmental Strategy and integrate the environmental perspective into the Army's Future Force concept. To meet this goal, DEI—

- Integrates environmental considerations and incorporates lessons learned into all appropriate Army and joint publications and references.
- Provides an organization of environmental subject matter experts to support operational requirements.
- Develops and provides training for military and civilian personnel.
- Develops military and civilian leaders who understand their environmental responsibilities and incorporate environmental considerations into their operational planning and decisionmaking.
- Instills an environmental ethic and situational awareness in Soldiers and civilians to support the Army environmental vision.
- Enhances quality of life and community relations.
- Ensures that environmental considerations are incorporated where support functions are provided to the operational force.

The goal is to integrate environmental considerations in support of the Army's mission while protecting the force and the environment by building a professionally competent force with the appropriate skills, knowledge, and environmental ethics.

DEI provides many environmental products, examples of which include—

- Army correspondence course programs.
- Training videos, graphic training aids, and training support packages.

- Doctrine products such as field manuals and training circulars.
- Environmental Baseline Survey and the Occupational and Environmental Health Site Assessment Handbook.
- Environmental, Safety, and Occupational Health Base Camp Handbook.
- Online training catalog and courses.
- Environmental Deployment Toolkit compact discs.
- Joint environmental training.
- Environmental management system training materials.

The organization also has mobile training teams that can provide predeployment environmental training when needed. DEI is actively involved with various Army and multiagency committees and work groups.

DAIM–ISE and IMCOM

The Army Environmental Division (DAIM–ISE) and Installation Management Command (IMCOM) operate under the Assistant Chief of Staff for Installation Management (ACSIM). ACSIM and its subordinate organizations focus on the concerns specific to military installations. DAIM–ISE is the principal advisor to the ACSIM regarding environmental programs. It develops strategic policies and establishes priorities, resources, strategy, and program guidance related to managing and resourcing all environmental programs. It also ensures that environmental program priorities and activities enable the Army mission. Its vision is to foster environmental stewardship and installation sustainability through integration of environmental values.

DAIM–ISE develops and issues Army Environmental Program priorities so that subordinate elements have adequate authority to accomplish installation/activity missions. It has the responsibility for environmental program resource requirements, validation, and programming of resources into the program objective memorandum and establishment of resource levels to support the Army Environmental Program priorities. Coordination is conducted internally and with Army staff elements, the Secretary of the Army staff, Army commands, Army service component commands, direct reporting units, the Reserve Components, and field operators to ensure that environmental requirements are integrated into their programs. It participates in federal department-level meetings and workgroups led by the Office of the Secretary of Defense to represent service-level positions on issues affecting the Army's mission.

The development and visibility of environmental program issues are maintained through coordination with components and states. Program reviews for performance management are conducted according to established strategies and program priorities. DAIM–ISE prepares briefings, information papers, and reports for Army leadership and Congress and supports audits and Freedom of Information Act requests.

USAEC

USAEC is directly subordinate to IMCOM in the Army environmental structure. Over the past 36 years, under various names and through evolving missions, USAEC has supported the Army's expanding role as a world leader in environmental stewardship and responsibility. It integrates, coordinates, and oversees the implementation of the Army's environmental programs for the Army staff. Armed with lessons from the past and the vision of a transforming Army, USAEC provides the knowledge, tools, and program development assistance that enable military readiness and sustainable military communities through training, operations, and acquisition, using sound environmental practices.

The command provides a broad range of environmental products and services to Headquarters, Department of the Army, major commands, and commanders worldwide, including leadership, focus, direction, and innovative solutions to the Army's future environmental challenges. USAEC has developed and sustains a team of environmental professionals dedicated and empowered to accomplish the mission through the support of military installations.

Environmental Purpose

There are several different organizations within the Army with specific environmental missions. Each organization supports the Army mission, its strategy for the environment, and its installations worldwide; ensures compliance with environmental laws and regulations; and ensures the health and well-being of the Army's Soldiers and their families through the use of sustainable practices and programs.

Ms. Miller is an environmental protection specialist with the Directorate of Environmental Integration at the United States Army Engineer School at Fort Leonard Wood, Missouri. Previously, she was the hazardous waste and underground storage tank program manager for the Illinois Army National Guard. She obtained professional credentials as a Certified Hazardous Materials Manager in 2005 and holds a bachelor's from Monmouth College, Monmouth, Illinois. She has been a member of the Illinois Army National Guard for 23 years and is a sergeant first class with the Illinois Joint Force Headquarters.

Ms. Carney is an environmental protection specialist with the Directorate of Environmental Integration at the United States Army Engineer School at Fort Leonard Wood. Previously she was an environmental protection specialist at United States Army Dugway Proving Ground, Utah, where she served as program manager for the installation Environmental Management System, pollution prevention, recycling, hazardous waste minimization, and environmental reporting programs.

Can the Modular Engineer Battalion Headquarters Be Multifunctional?

By Major William C. Hannan

The 5th Engineer Battalion received its deployment order for Operation Iraqi Freedom late in 2007 and deployed the following year. The battalion had recently transformed to the new modular structure, and its three mechanized companies became one sapper company and two mobility augmentation companies (MACs). Its projected mission in Iraq was route clearance, rapid crater repair, route sanitation, and culvert denial, so the battalion trained hard for those tasks. That training included a mission readiness exercise at the National Training Center, Fort Irwin, California. However, soon after deploying to Iraq, the battalion was involved in multiple construction projects across the areas of operation of two brigade combat teams (BCTs). Regardless of the type of engineer battalion or the missions its leaders expected to have, those BCTs needed immediate construction and technical support.

Engineer Modularity

The concept of engineer modularity is that an engineer battalion can command and control, plan, integrate, and direct the execution of two to five engineer companies (sapper, mobility augmentation, horizontal, vertical, multirole bridge, or other specialty unit), depending on the mission and engineer requirements. The majority of engineer battalions that have deployed to Operation Iraqi Freedom and Operation Enduring Freedom conducted operations across multiple engineer functions on an area basis. They have mostly performed combat and general engineering, but some also provided geospatial engineering. This arrangement offers many advantages over a single-function battalion that only conducts either combat engineering or general engineering missions. However, in order to capitalize on these advantages, the engineer battalion must organize and train correctly so it is able to conduct operations across all engineer functions.

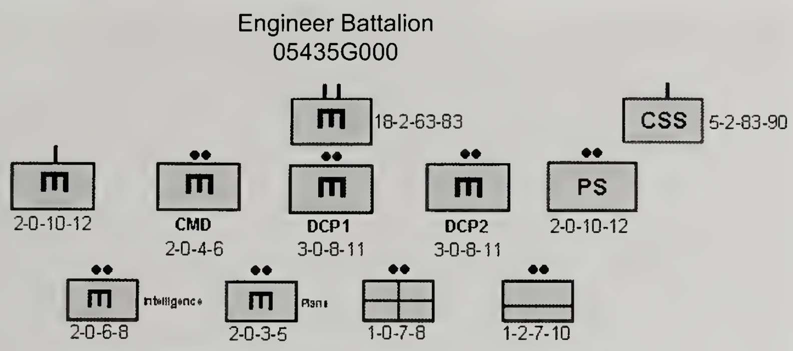
While in Iraq, the 5th Engineer Battalion commanded and controlled two sapper companies, two MACs, a combat support equipment (CSE) company, a horizontal engineer company, and a multirole bridge company (MRBC), as well as an Air Force utility detachment and a geospatial team. Like most previous combat engineer battalions in its position, the 5th could easily plan and execute the combat engineering tasks and was able to quickly execute geospatial tasks that supported all operations. The biggest challenge for the 5th, and many of the other battalions deployed, was construction management or tasks within the general engineering function. Unfortunately, the new engineer battalion organization (see Figure 1) is not built to effectively manage construction operations.

5th Engineer Battalion Soldiers perform a culvert repair mission in Diyala Province, Iraq.

Battalion Staff Organization

Proper organization of the engineer battalion staff is the first hurdle to conducting construction management. The 5th Engineer Battalion managed the construction effort for one horizontal engineer company, one CSE company, and an Air Force utilities detachment (the equivalent of 6 horizontal platoons, 2 vertical platoons, and a utility repair platoon). Additionally,

Shaded Section: FM 3-34, Figure B-7, Page B9



MISSION

To provide an engineer headquarters for command and control of engineer operations in the AO.

CAPABILITIES

- Conducts engineer missions with 2-5 task-organized engineer companies and other force pool units.
- Provides command and control of units task-organized to the battalion.
- With task-organized engineer units, the battalion is capable of conducting engineer operations including combat and general engineering missions.
- With task organized combined arms units, the unit is capable of conducting of combat missions, when required.
- With task organized units, the unit is capable of conducting area damage control, when required.
- Provides unit administration, religious, and logistic support to task-organized units.
- Provides two scalable, deployable command posts as required.

DEPENDENCIES

- Appropriate elements of corps or division for religious, legal, health service support, finance, personnel and administrative, and logistical services.
- TOE 63357G000, FSC EN BN, for field feeding support, fuel and supplemental transportation of Class IV and V supplies as well as support for limited field maintenance.

SUPPORTS

- The battalion headquarters provides C2 for engineer operations supporting brigade, division, or corps operations.

RULE OF ALLOCATION

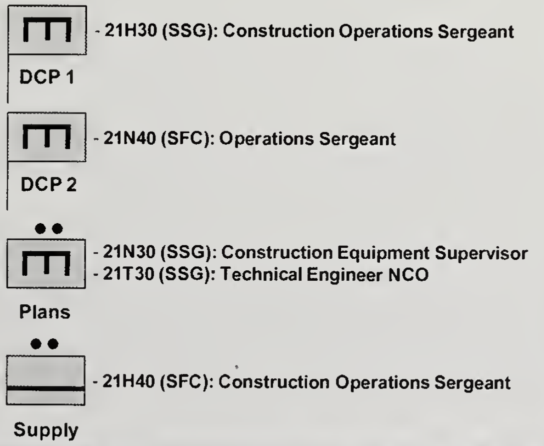
One engineer battalion headquarters per 2-5 engineer companies.

Figure 1

the battalion conducted quality assurance/quality control (QA/QC) inspections, performed the duties of a contracting officer technical representative, and assisted with technical scope-of-work reviews and project creation for BCT and provincial reconstruction team civil capacity projects. There was a tremendous need for technical planning, support, resourcing, and execution at the battalion level. The engineer battalion modified table of organization and equipment (MTOE) has construction noncommissioned officers (NCOs) with construction military occupational specialties (MOSs) throughout the staff structure (see Figure 2), but there is no construction cell to coordinate and synchronize efforts to ensure that the commander's priorities are being met.

The battalion restructured just before deploying, based on the need for deliberate construction planning and execution. Figure 3, page 68, shows how the 5th reorganized for Operation Iraqi Freedom. This restructuring was essential in order to provide efficient, quality construction. Although most of the needed MOSs were within the battalion MTOE,

Construction MOS Positions in Engineer Battalion



- 21H30 (SSG): Construction Operations Sergeant
- 21N40 (SFC): Operations Sergeant
- 21N30 (SSG): Construction Equipment Supervisor
- 21T30 (SSG): Technical Engineer NCO
- 21H40 (SFC): Construction Operations Sergeant

Figure 2

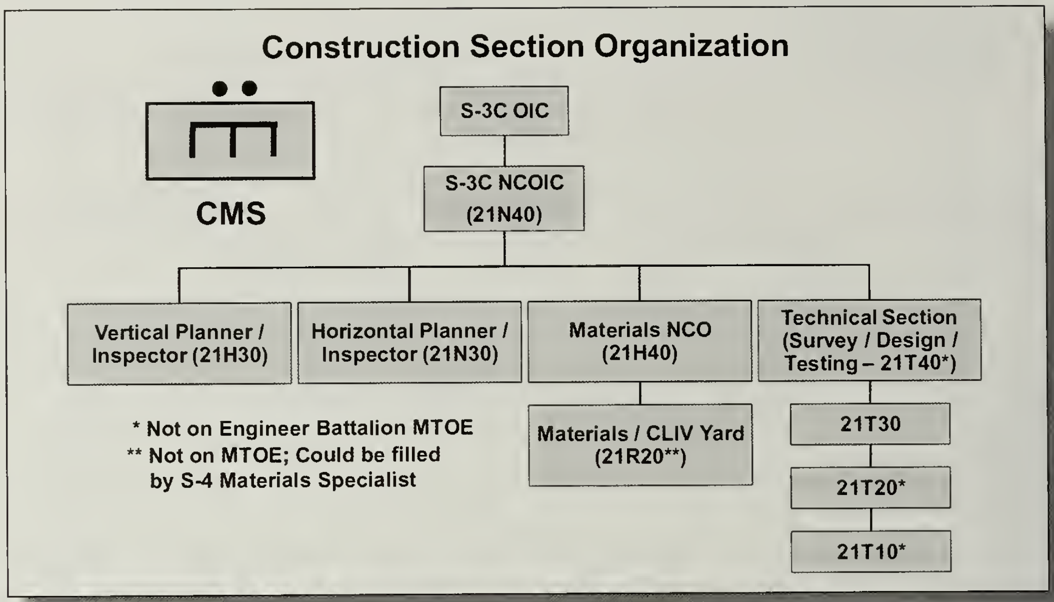

Construction Section Organization
CMS
S-3C OIC
S-3C NCOIC (21N40)
Vertical Planner / Inspector (21H30)
Horizontal Planner / Inspector (21N30)
Materials NCO (21H40)
Technical Section (Survey / Design / Testing – 21T40*)
Materials / CLIV Yard (21R20**)
21T30
21T20*
21T10*
* Not on Engineer Battalion MTOE
** Not on MTOE; Could be filled by S-4 Materials Specialist

Figure 3

not having a dedicated construction management section (CMS) before deployment severely degraded construction management for the first six months of the deployment. Those six months were spent developing the battalion's construction systems, acquiring needed equipment and software, and delineating duties and responsibilities. An important MOS not included in the battalion MTOE was a technical engineering specialist, or 21T. The battalion is authorized one senior technical engineering specialist in the plans section, but in order to conduct survey, design, soil testing, concrete testing, compaction testing, and other technical requirements, a battalion needs at least four Soldiers with that specialty. The 5th deployed with one excess NCO with the specialty and pulled two more Soldiers with that MOS up to the battalion CMS from an attached company.

Technical equipment is also missing from the engineer battalion MTOE. When creating the technical section in the CMS, the battalion procured soils and concrete testing and analysis equipment, global positioning system survey instruments, electric density gauges, AutoCAD®, Theater Construction Management System (TCMS), and Microsoft® Project software. See Figure 4 for a list of the minimum equipment needed for a technical section at the battalion level. Under modularity, this gap could be fixed by attaching a survey and design team at an allocation of one team per three construction companies, but the reality is that engineer battalions often do not get this asset. Some engineer battalions with "combat heavy" roots had a survey and design team even if the battalion had fewer than three construction companies. While engineer brigades have a survey and design section on their MTOE, battalions cannot count on the brigade's team to support the battalion's requirements. Additionally, engineer battalions are often directly attached to divisions and need an internal capability for survey, design, and testing. Without the technical section and/or equipment, the battalion is unable to properly design projects or conduct QA/QC inspections. It is difficult for a battalion to enforce construction standards when it does not have the capability to test or build to a defined standard.

Technical Section Required Equipment

- LIN V71587 (NSN 6635-00-641-3641) – Test Set, Concrete
- LIN V64463 (NSN 6635-00-641-3642) – Test Set, Asphalt
- LIN V92959 (NSN 6635-00-641-3643) – Test Set, Soil
- LIN G44569 (NSN 6675-00-641-3610) – Drafting Equipment Set, Battalion
- LIN U70179 (NSN 6675-00-641-3639) – Tool Kit, Technical Engineering, Surveying
- LIN U71275 (NSN 6675-00-641-3600) – Surveying Set, Topographic Section
- W02673 (NSN 6635-01-030-6896) – Tester Density and Moisture Soil-Asphalt
- AutoCad, Microsoft Project, and a 42" Hewlett-Packard Plotter

Figure 4

Predeployment Training

The second concern for the engineer battalion is training construction management and general engineering tasks before deployment. Without a dedicated construction officer and CMS on the MTOE, units often overlook the need to train these tasks when not deployed. Units normally do not assign a construction officer unless they have roots as a combat heavy or construction effects battalion or have modular construction units attached in garrison. Additionally, construction NCOs on staff are often assigned as operations, schools, or training NCOs. With the loss of technical capability in the Engineer

A 5th Engineer Battalion survey team sights in a road during construction operations.

Regiment, it is even more important now to continue to develop technical skills in officers and NCOs.

Once the first obstacle is cleared and the battalion maintains a permanent CMS, the next step is to conduct individual and collective training. The construction officer needs to be a degreed engineer with skills in contracting, project management, survey and design management, writing technical scopes of work and construction directives, QA/QC, Microsoft Project, and TCMS. The NCOs in the CMS need similar skills, but specifically as they apply to their MOS or duty position. Collective training is more difficult for several reasons. First, engineer battalions are not multifunctional before they deploy, with a few exceptions such as the 54th Engineer Battalion in Germany. Most either have all-modular combat units, such as sapper or MAC companies, or modular vertical or horizontal construction companies. This causes weaknesses in both types of engineer battalions, although those with modular construction companies in garrison can usually transition easier into a multifunctional battalion. The engineer battalion without modular construction companies in garrison normally is not organized or trained to manage construction and has a much steeper learning curve when transitioning to a multifunctional battalion.

One potential solution to the issue would be to organize battalions in garrison as multifunctional battalions. When possible, engineer brigades should organize battalions with both modular combat and construction companies. This will enable the engineer battalion to train its staff across all engineer functions. For example, the 94th Engineer Battalion—previously a combat heavy unit but now composed entirely of modular construction companies—and the 5th Engineer Battalion—previously a corps mechanized unit but now comprising all modular combat companies—are both located at Fort Leonard Wood, Missouri, under the 4th Maneuver Enhancement Brigade. In order to enable the staffs of the 94th and 5th Engineer Battalions to train across all engineer functions, they could each give one organic company to the other battalion. If that was not feasible, they could attach companies to the other battalion for specific training events or construction projects.

Another issue affecting collective training is the ability to plan, develop, resource, and execute construction projects in garrison similar to ones that will be expected in a theater of operations. Every engineer battalion needs to work construction planning into its training plans, though it is often difficult because construction projects in garrison are difficult to resource and synchronize. The members of Air Force construction units are highly skilled in their specialties because they execute construction projects and continually work in their specialties while in garrison. For major training events such as a trip to the National Training Center, units should plan and resource construction far enough in advance to enable a construction unit to complete a project during or adjacent to a rotation. The planning of the project

Engineers clear and grub a road during construction operations.

would be training in itself. The focus should not be strictly on finishing the project within the rotation window, since that would limit the scope to small projects only. Rather, the focus should be on projects similar in scope to those the unit will build while deployed.

Quality and Efficiency Ensured

The 5th Engineer Battalion completed more than 150 construction projects during one Operation Iraqi Freedom deployment, including road construction and repair, helicopter landing zones, joint security stations, combat outposts, force protection construction and upgrades, Southwest Asia huts for housing expansions, electrical upgrades, and numerous other projects. The battalion was only able to ensure quality and efficiency after creating a CMS, acquiring the right technical equipment, and developing officers and NCOs with skills in contracting, project management, survey and design management, resource management, writing technical scopes of work and construction directives, and QA/QC planning. Much of this development was the result of on-the-job training. All engineer battalions should continue to build and retain great engineers, which requires a properly organized battalion CMS that improves technical capability through training focused on construction management.

Major Hannan is the operations officer for the 5th Engineer Battalion, Fort Leonard Wood, Missouri. Previously, he was the battalion executive officer; a sapper platoon leader, brigade engineer, and aide-de-camp in the 82d Airborne Division; United States Army, Europe topographic officer; company commander, planner, assistant operations officer, and brigade maintenance officer in the 18th Engineer Brigade; and small-group leader for the Engineer Captains Career Course, Fort Leonard Wood, Missouri. He holds a bachelor's in civil engineering from The Ohio State University and a master's from the University of Missouri–Rolla (now Missouri University of Science and Technology).

ENGINEER MODULARITY

By Lieutenant Colonel Steve Danner and Mr. Don Wenzel

At the time that the Engineer Regiment began its transformation to the Future Engineer Force structure, the United States Army was pursuing a parallel effort to transform its basic warfighting force from a division-centric force to the modular brigade combat team (BCT) force. Engineer modularity was a central linchpin that supported the transformation of that division force to the BCT force. The original premise was for those engineers who would be needed routinely to support mobility capabilities to remain as part of the BCT. All other engineer force structure capabilities would migrate to the Engineer Force Pool.

Categories of Engineer Modularity

Engineer modularity is identified by four categories:

- Embedded
- Baseline
- Mission modules
- Engineer command and control (C2)

Embedded. The embedded engineer force structure is the engineer structure organic or assigned to the BCT. The remaining three categories are part of the Engineer Force Pool.

Baseline. The baseline structure is the seven basic engineer companies:

- Sapper company (airborne, wheeled, and tracked)
- Mobility augmentation company (MAC)
- Multirole bridge company (MRBC)
- Clearance company
- Horizontal construction company
- Vertical construction company
- Engineer support company

Mission Modules. Engineer mission modules consist of the following:

- Asphalt team
- Concrete team
- Construction management section
- Engineer detachment-headquarters (canine)
- Engineer squad (canine)
- Engineer diving team
- Engineer facility detachment (EFD)
- Equipment support platoon
- Explosive hazards team (EHT)
- Explosives hazards coordination cell (EHCC)
- Firefighting team
- Headquarters and fire truck
- Forward engineer support team–main (FEST–M)
- Forward engineer support team–advance (FEST–A)
- Geospatial planning cell
- Prime power battalion
- Prime power company
- Quarry platoon
- Real estate team
- Survey and design team
- Well drilling headquarters and team
- Topographic company

Engineer Command and Control. Engineer C2 consists of the engineer battalion, headquarters and headquarters engineer brigade, and theater engineer command.

During the Army Force Generation (ARFORGEN) cycles of *reset, train/ready,* and *available*, the baseline force structure engineer companies are designed so that a company commander can focus on specific individual and collective tasks associated with the specific capabilities of the company. That way a sapper company can concentrate on combat engineer tasks, a MAC on assault breaching and bridging and countermobility tasks, and an MRBC on bridging. During the *train/ready* phase, the battalion commander sees that the collective tasks appropriate for an engineer mission team are trained. In effect, this creates task-organized companies capable of performing engineer missions related to specific missions.

A key factor in developing the right engineer force structure is the planner involved in the request for forces. In some cases, the planner will not be an engineer, so it is imperative that planners at all levels are familiar with the specific capabilities that each baseline or engineer mission module brings to the fight. Engineers at each level of the fight need to be able to articulate these capabilities to planners.

(continued on page 76)

Protecting Secure Facilities From Underground Intrusion Using Seismic/Acoustic Sensor Arrays

By Lieutenant Colonel Robert E. Tucker Ph.D., Colonel James R. Rowan (Retired), Dr. Jason R. McKenna, Dr. Lillian D. Wakeley, Mrs. Sarah McComas, Ms. Julie R. Kelley, and Mr. Thomas E. Berry

The necessity to detect tunnels that penetrate secure facilities such as detention centers, government offices, borders, or forward operating bases (FOBs) has developed from the need to deter or counter underground exploitation along the southern United States border, Iraq, and other facilities. The United States Army has been in the tunnel detection business for many years, to include providing support to other government agencies in locating tunnels along our southwest border. Iraq became an issue with the nearly successful escape from a tunnel constructed over several months by detainees in an Iraqi center.[1] *A team of researchers was sent to Iraq to investigate the utility of several technologies that perhaps could detect voids as small as 1 meter in diameter. A third technology investigated was a passive seismic/acoustic array. The team built a 7-meter-deep tunnel at the same depth as the escape tunnel.*[2] *The array was tested around the camp to garner the seismic and acoustic characteristics of the typical vehicles and machinery and their interactions with the soil and each other. The in-tunnel tests were conducted using typical digging tools available to the detainees. All of these signals were then used to "train" the computer algorithms. Plans were laid for a larger study and more detailed sediment and mineral studies. There is a definite requirement to thoroughly understand the interactions between sound propagation and the local geology and geochemistry of the sediments.*

Site Geology

Distribution of mineral composition, grain size, and moisture content of soils are known to affect attenuation of electromagnetic and other geophysical sensor signals.[3,4] The geologic setting of an area determines the suitability of a given technique for locating visually obscured features such as tunnels in the shallow subsurface.

In the area surrounding the test tunnel, the upper 6 meters of sediments were deposited as part of a delta during a time of higher sea level, when low-gradient rivers carried fine-grained sediments into a shallow sea. The resulting sediments vary in thickness, density, moisture content, and color—both horizontally and vertically. These sediments are now overlain by fine-grained, windblown material. Subsequent natural and man-caused processes have changed much of the original sedimentary layering.

The upper sediments can be cemented with either calcium carbonate (calcite) or calcium sulfate (gypsum) to a depth of about 30 centimeters and are difficult to dig through. In the upper layer, the gypsum forms veinlets some 5 millimeters in diameter and spaced quite closely throughout the layer. Crystals of gypsum up to 3 centimeters in length are present in the upper layers. The lower sediment layers are typically devoid of visible gypsum crystals. These veinlets are hard, making digging difficult and producing definite signatures that can be picked up with the sensors (see Figure 1).

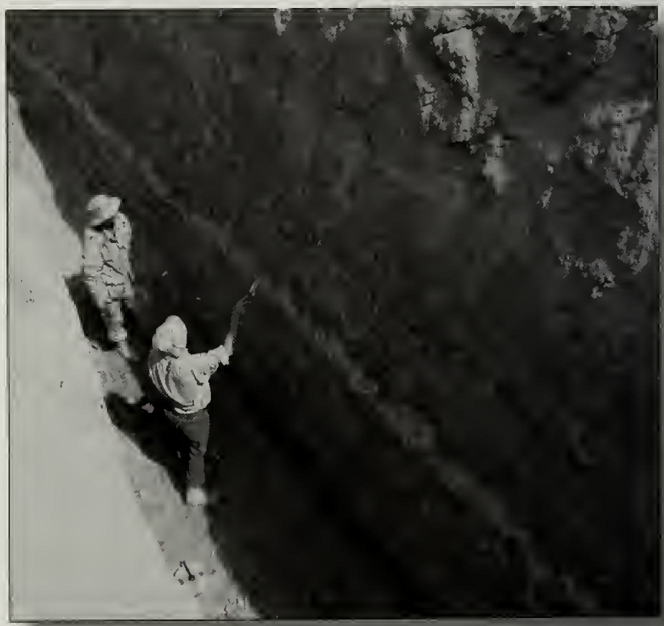


Figure 1: Typical strata sequence in the study area. Subtle vertical color changes represent varying geochemical characteristics of the sedimentary environment.

At some locations in the study area near the surface, there are substantial areas of white cemented sand that is locally called "gatch" (see Figure 2, page 73). Gatch forms when carbonate or sulfate minerals (calcite, gypsum, or both) are deposited by movement and evaporation of water in the pore space of previously deposited sand.[5] When water is mixed with a 50-50 mixture of gatch and other surficial material, an extremely hard block is formed. This local geochemical phenomenon has significant impact on potential tunnel

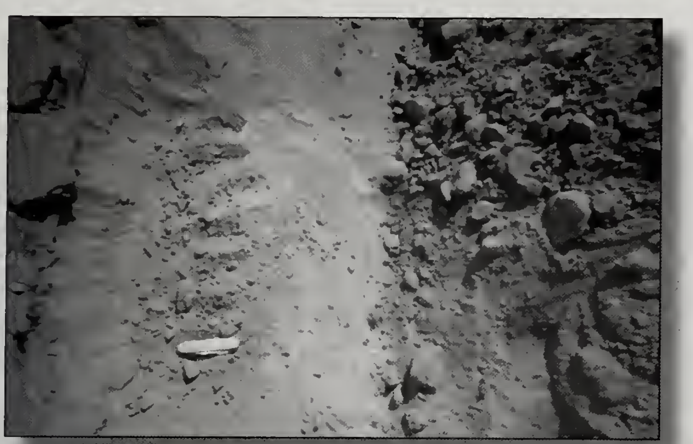


Figure 2. A layer of gatch about 20 centimeters below the surface. This layer was about 10 centimeters thick.

construction. The top some 20 centimeters of fine windblown sand is loose, but below that, the sand is cemented. This layer is strong enough to support pedestrian traffic and even heavy equipment. Thus, even in highly disturbed sediments and sands, stabilized shallow tunnels are possible after just a short time.

On the FOB, a thick sequence of unconsolidated sand occurs at about 7 meters. This coarse sand is composed of angular grains of quartz (particles 2 millimeters in diameter) and extends at least 1 meter below the tunnel floor. Digging in the sand layer is easy. This sand is distinctly different from the other sediments on the FOB and, if observed on the surface, is a telltale sign of digging. Understanding the geology of an area will provide good intelligence signs of digging in any location. Use of imaging technologies can be key to detecting digging in many locations.

Within the lower sand layer and the silt just above it, black concretions appear as very hard clusters of sand grains cemented in a star-burst pattern by a black mineral up to 3 centimeters in diameter (see Figure 3). Digging through these mineral clots makes a distinct high-pitched sound when they are struck with an entrenching tool or chisel.

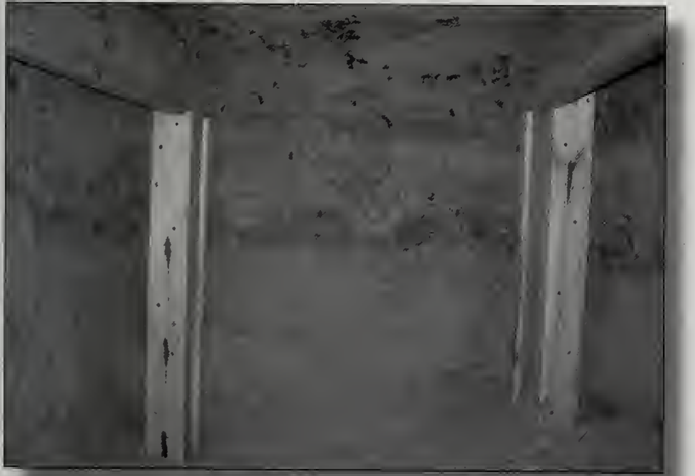


Figure 3. Black mineral concretions at the tunnel face. Striking these minerals makes a distinctive noise.

The extraordinary lateral and vertical variability of the sediments in the upper several meters of soil at the site caused the failure of traditional geophysical techniques to locate tunnels or voids. The presence of fine-grained minerals and soluble salts increased the conductivity of the soil and precluded downward propagation of signals from methods such as ground-penetrating radar and electromagnetic surveys. These unfavorable geologic factors prompted the team to develop passive seismic-acoustic technologies to detect tunneling activity rather than the tunnels themselves.

Initial Experiments

The initial project centered on data collection from a tunnel the team dug at the interface of the compacted silt layers and the unconsolidated coarse sand layer. The sensor array was placed at right angles to the tunnel and data collected over several days.[6] This data was used to populate the computer algorithms and train the users. During data collection, the rainy season began. This 36-hour rain event provided an excellent opportunity to compare the effect of soil moisture on the propagation and receipt of signals by the array.[7] The rain event allowed the team to quantify the signal changes from the full range of mechanical and other sources on a secure facility. The most significant impact was the increase in amplitude; nearly all signals were detected from greater distances through moist soil than had been observed during the dry season (see Figure 4).

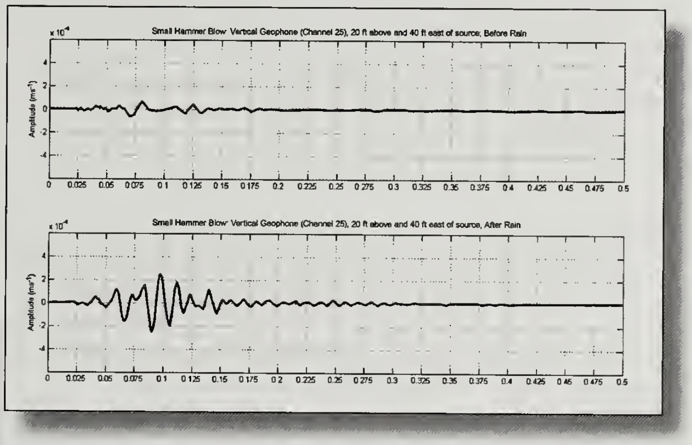


Figure 4. Ambient acoustic noise field before and after 36 hours of steady precipitation.

Beetles, insects, and rodents burrow within the sediments and can dig large galleries. With extended reach of the data collection array in a wet environment, some of these signals could be identified as human digging without proper analysis.

During the 2008 sampling season, detailed soil samples were collected. Long trenches were dug to a depth over 2 meters and a small block of one wall was selected for sampling. Ten centimeters deep, drive cylinders were used to collect *in situ* samples. The soil around the cylinders was carefully removed and saved for further analysis (see Figure 5). The collection process continued to a depth of about 2 meters.

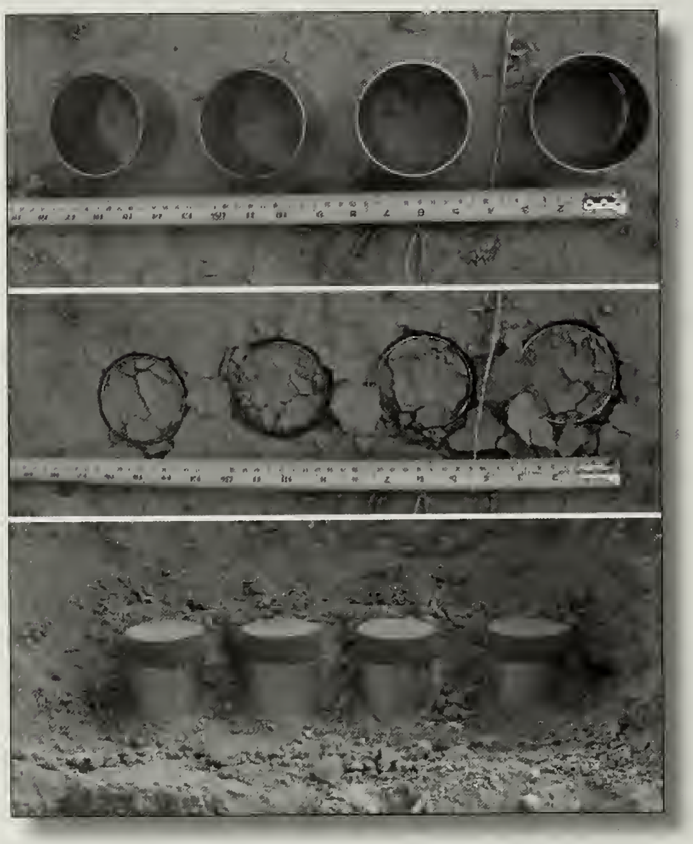


Figure 5. The top panel shows the drive cylinders before emplacement. The middle panel shows the emplaced cylinders. The bottom panel shows the cylinders just before being removed from the sample layer.

Array Around the Camp

The physical tests and the soil analysis indicated that a seismic and acoustic array could be installed around a facility. Automated processes could be used to filter out the vast majority of the energy sources while still differentiating the signals of interest that were likely tunnels being constructed or tunnels being used.

Commercial off-the-shelf geophones were emplaced around compounds where tunnels had been found. Sensors were placed in pairs (one deep and one shallow) at regular intervals covering the entire perimeter. The geophones were connected to a buried cable that circled the compound. Installation of the sensors and associated cabling required a significant effort because the compound infrastructure was already in place. Detection systems need to be integrated into the construction design and installed with initial construction when possible.

Placing the geophones in pairs was crucial to discriminating between deep and shallow energy sources. Acoustic sensors were placed at regular intervals to help filter out the huge amount of surface background noise from sources that included vehicles, generators, rotary wing aircraft, explosions, and conversations.

After the signal was digitized, it went through an outside the continental United States (OCONUS) filter to determine which signals have characteristics similar to the signals of interest. An initial statistical analysis of these signals was computed to reduce the amount of data sent to the Continental United States (CONUS) via a satellite uplink. The data CONUS received went through a set of sophisticated algorithms which again reduced the data the analyst needed to review. The signals that remained were generally of interest to the analyst. The filtering processes significantly reduced the amount of data that needed to be reviewed by a human, but still the most important part of the system was a human analyst. Each area of interest was reviewed by a trained analyst to determine what kind of energy source produced the signal, whether the signal was generated by threat activity (such as digging with a hand tool—scraping of tools against wall or floor) or clutter activity (such as construction, vehicle traffic, or generators). This was completed by looking and listening to sections of the digitized signal since the human eyes and ears comprise one of the best pattern-recognition systems. The analyst was able to identify these signals by comparing them to signals from the Tunnel Activity Detection System (TADS) signal library. This library included both types of signals—threat activity and clutter.

After an analyst identified an area with threat activity (see Figure 6), he sent a notification to the appropriate authority at the secure facility. These notifications were vetted to determine if they were actually threats. The results of this process produced great success and were added to the signal library to further expand our knowledge of the threat.

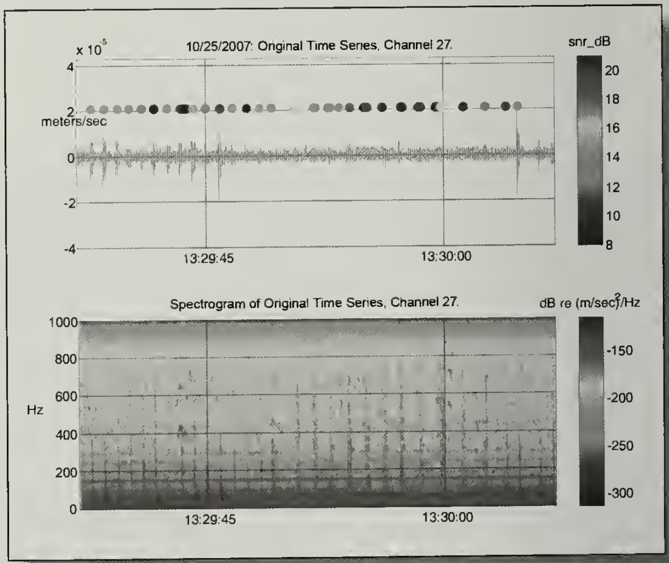


Figure 6. An example of threat activity. The lines in the lower graph (between 10 hertz and 400 hertz) are impacts with a hand tool. The dots above top graph indicate detections made by the TADS algorithm.

Recent Threats

After a unit received a tip that something strange was going on there, a young lieutenant led his patrol to a bakery where two men were sitting. The quiet street in Mosul quickly became a hub of activity. The patrol noted that there was no bread or even flour in the bakery, just shovels and piles of dirt. The patrol discovered the tunnel entrance, and a check of the database showed that the two men had been arrested earlier on suspicion of being al-Qaeda supporters. A tunnel went about 50 feet from the bakery toward a secure governmental facility. The plan seems to have been to set a large amount of explosives in a gallery under the facility to inflict as much damage as possible.[8] The tunnel appeared to be constructed in compacted sediments with only a few rocks. The sediment seemed relatively strong and did not appear to require a lot of shoring to provide short-term use of the structure.

On 2 September 2008, another tunnel was discovered on our southwest border, with its origins in a house in Mexicali, Mexico, heading toward Calexico in the United States (see Figure 7). The tunnel—about 1.5 meters wide by 2 meters high and about 5 to 6 meters below the surface, with lights, piped air, and rails—appeared to have been dug with hand tools through compacted sediments. The soil was competent enough to hold its shape, allowing the builders to use minimal supports.

Conclusions

Tunnels remain a persistent threat to U. S. security, both at home and abroad. Due to the highly local and variable nature of the near surface, imaging techniques to discover tunnels has met with many challenges. The most promising technology was passive seismic/acoustic arrays. Through the second deployment, the team constructed an array around a secure facility. The initial data were added to the more extensive subsequent data and used to “train” the algorithm.

The installation, validation, and transition of this system were an overwhelming success, advancing from a field test in 2005 to a fully operational system in a combat zone in one generation. Over the first three months of operation and experience, the analyst tasks were reduced by an order of magnitude and the signal-processing algorithms were continually improved.

A systematic geologic and geochemical investigation of the impacts of soil properties on seismic/acoustic wave propagation could benefit further refinement of the algorithm. The geologic and geochemical aspects of the physical environment will impact the ability to detect active tunneling or tunnel use, as well as the actual construction of a tunnel. Understanding this physical environment will have effects on the design and construction of secure facilities and the construction materials used. Knowledge of the subsurface soils will provide clues to tunneling activities by direct and indirect observation on and away from a secure facility. The use of tunnels to penetrate or breach secure facilities has been used for thousands of years (with sappers and mining engineers leading the way). The current struggles in Southwest Asia are no exception to the threat of subterranean intrusion (tunneling). Engineers with geology/geochemical/geophysics expertise could make technical assessments throughout the planning and execution phases of these projects. The engineers and military police must work together to mitigate this threat and continue to protect our secure facilities from subterranean intrusion.

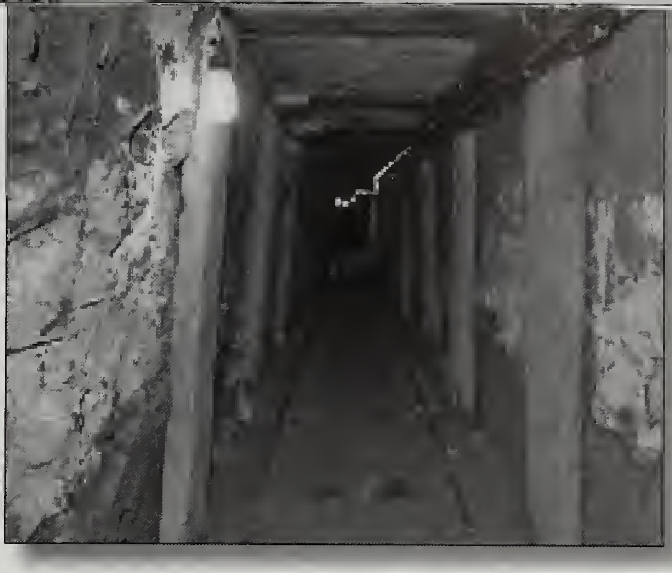


Figure 7. Discovered tunnel leads from Mexicali toward the United States.

Acknowledgments: The authors wish to thank the 16th Military Police Brigade and the 300th Military Police Brigade for their support during this deployment. The servicemembers from the Army, Navy, and Air Force who were part of these military police brigades were exceptional. Thanks are also owed to the tremendous effort of our industry partners, BBN Technologies, who were crucial in virtually every aspect of integrating this work.

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Dr. Wakeley is a senior research geologist at ERDC. She served as Chief of the Engineering Geology and Geophysics Branch and has been involved in tunnel detection and near-surface geology, as well as specialty materials for use in challenging environments.

Mrs. McComas is a research computer engineer at ERDC. She holds a bachelor's in computer engineering from Mississippi State University. Her research focus has been in seismic/acoustic monitoring, and she has supported tunnel detection missions both along the U.S. border and overseas.

Ms. Kelley is a research geologist at ERDC. She holds a master's in geology from the University of Mississippi and a bachelor's in nursing from Washington State University. Her expertise is geological site characterization and stratigraphy and sedimentation processes.

Dr. Jason R. McKenna is a geophysicist at the United States Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi, and the technical lead for the ERDC Tunnel Detection and Deterrence Team.

Mr. Berry is a research biologist in the Environmental Laboratory, Environmental Sensing Branch, at ERDC. In this capacity, his expertise is terrain background characterization using EO/IR, LiDAR, Spectrometers, and RTK-GPS. He has supported several military programs both CONUS and OCONUS, specializing in countermine technologies. He holds a bachelor's in landscape management from Mississippi State University.

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("Modularity," continued from page 71)

Sharing Lessons Learned

The Engineer Regiment's transition to a modular force is now more than 90 percent complete. That means that we are beginning to see adjustments that need to be made in our organizations, as well as changes that need to be made to the tactics, techniques, and procedures we use when employing these forces. It is essential that lessons learned from the employment of our engineer forces are captured and shared so that best practices can be incorporated into the way we train and fight.

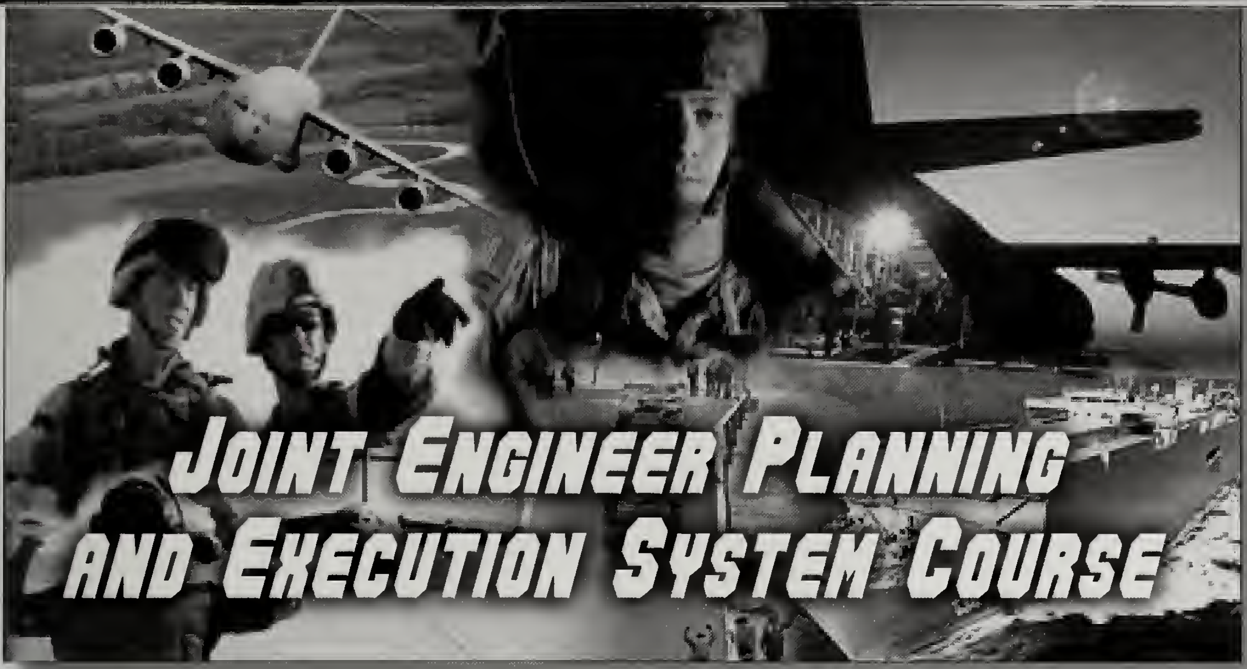
Current doctrine is being revised to address the engineer force structure at all levels to ensure that emerging lessons learned from Iraq and Afghanistan are incorporated into our doctrine. The doctrine for employment at the BCT is published, and the doctrine for echelons above the BCT is close to being published. Engineer organizations will continue to incorporate these lessons learned while still addressing the full spectrum of engineer tasks and support to enduring operations.

There are still changes being worked for the Engineer Regiment. The prime power company and battalion have been restructured to better use prime power assets. The topographic company has been restructured to provide a required capability at all levels of the fight. There is an initiative to add a geospatial warrant officer to each of the BCTs as was done for the Stryker BCT. The MRBC is being considered for review to bring its organization in line with the other baseline company structures. The clearance company is now under consideration for a force design update incorporating lessons learned from Operations Iraqi Freedom and Enduring Freedom. There is also considerable effort at this point to restructure engineer forces within the BCTs to provide a wider range of engineer capability to BCT commanders.

There will continue to be force structure adjustments to the Engineer Regiment in the coming years. Each of these efforts will be attuned to keeping it relevant to the fight while providing the commander with the best-trained, best-organized, and best-equipped force feasible.

Lieutenant Colonel Danner is Chief, Maneuver Support Organizations Branch, Concept Development Division, Capability Development and Integration Directorate, United States Army Maneuver Support Center (MANSCEN), Fort Leonard Wood, Missouri. His branch documents requirements for personnel and equipment in chemical, biological, radiological, and nuclear (CBRN); engineer; military police; maneuver enhancement brigade (MEB); 20th Support Command (CBRNE) and brigade special troops battalion (BSTB) tables of organization and equipment (TOE).

Mr. Wenzel is Team Chief for the Force Management Team, Maneuver Support Organizations Branch, Concept Development Division, Capability Development and Integration Directorate, MANSCEN. His team documents rules of allocation and capabilities needs analysis that support requirements for personnel and equipment in CBRN; engineer; military police; MEB; and BSTB TOE.



JOINT ENGINEER PLANNING AND EXECUTION SYSTEM COURSE

By Ms. Tara C. Valencia and Mr. Brad Steffey

The Joint Deployment Training Center (JDTC) at Fort Eustis, Virginia, offers a Joint Engineer Planning and Execution System (JEPES) course for joint engineer staff members. JEPES provides commanders and engineer staff with capabilities to tailor the time-phased force and deployment data (TPFDD) for engineer requirements. The application enables the staff to identify construction requirements, align engineer force structure, build engineer-specific requirements, and provide cost estimates within the TPFDD in coordination with the Joint Operation Planning and Execution System (JOPES) community.

JEPES operates through the Global Combat Support System–Joint (GCSS–J) web portal. Engineers can—

- Import JOPES plans.
- Generate engineer reports.
- Identify base complexes and construction requirements.
- Manage engineer units and resources.
- Construct an engineer-specific plan for use in JOPES.
- Extract facilities data using the GCSS–J Query Tool.

Engineer students learn how to—

- Use all of the JEPES menu functions.
- Construct a JEPES plan.
- Share and coordinate information with other GCSS–J portal users.
- Access federated applications, such as in-transit visibility (ITV), *CIA* [Central Intelligence Agency] *World Factbook*, and Port and Airfield Collaborative Environment (PACE).

JEPES is a one-day, certificate-awarding course. Engineer students should already have completed a GCSS–J portal course or be proficient with GCSS–J prior to taking JEPES. GCSS–J courses are essential for any engineer student or engineer action officer who needs to manage engineering assets in a TPFDD or operational environment at any combatant command or joint task force.

Training is conducted at Fort Eustis or by mobile training team in conjunction with a GCSS–J portal course. A final U.S. secret clearance is required to attend. To schedule a JEPES or GCSS–J portal course, contact Mr. Keith Davison at DSN 381-0932 or <*keith.davison@disa.mil*>.

JDTC develops and delivers functional Global Command and Control System–Joint training. This includes joint deployment planning and execution, situational awareness, and global force management training and education through standardized curricula to combatant commands, Department of Defense and other agencies, and professional military education institutions. JDTC trains Soldiers, Airmen, Sailors, and Marines as they will operate, using tools essential in the command and control of combat operations, joint logistics, force planning, and deployment. Training mirrors real-world operations in a hands-on environment, under the supervision and guidance of experts through resident, mobile training team, and virtual campus instruction. Distributed learning courses are available through Joint Knowledge Online (JKO) and JDTC websites. For more information, visit <*www.jdtc.jfcom.mil*>.

Ms. Valencia is a communications analyst for the Joint Deployment Training Center at Fort Eustis, Virginia. She holds a bachelor's from Mary Washington College and a master's from Averett University, both in business administration.

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BEST SAPPER COMPETITION 2009

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Front cover: Soldiers of the 814th Engineer Company emplace a ribbon bridge for Marine maneuver forces in Multinational Forces-West, Iraq. Photo by Captain Matthew T. Holden

Back cover: U.S. Army photos

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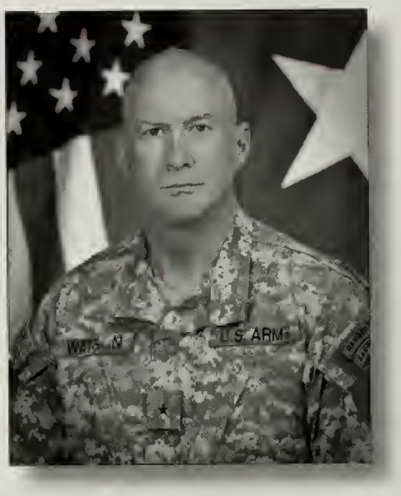
Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School

As I make my way around the Regiment, one of my key messages is that this Regiment of engineers is both a profession and a family—driven to serve the maneuver commander and solve his most complex problems as engineers. The holidays in November reminded us of the importance of family on many levels. From Veterans Day to Thanksgiving, we began the month by honoring our special family of veterans ... and ended it by celebrating the blessing of our immediate family at Thanksgiving.



At the holidays, the sense of family drives us to extraordinary measures. We travel great distances to regain that sense of belonging that only comes with being around family. Kids travel home; parents travel to see the kids. Leaders within our formations—and their families—put personal plans aside to be with their Army family no matter where... from our major Army installations to the most remote combat outposts in-theater. As I visited the mess halls on Fort Leonard Wood and served heaps of turkey, ham, and roast beef (I only do the meat) to the youngest members of our profession, it struck me that they have no idea where they will be spending the next Thanksgiving. That's the uncertainty and the excitement of our profession. But, there is an equally exciting and reassuring constant. No matter where a Soldier will be next year, they will be with family...if not with blood relatives, then with their Army Engineer Family. As one young AIT Soldier said, "That is what makes this bearable. I know that these guys (his 21B OSUT buddies) will be with me no matter where."

Achieving and sustaining that sense of family is vitally important to this Regiment and, frankly, we have faltered a bit in the wake of modularity's reorganization and restationing of forces. The fractured manner in which we have had to deploy units to meet demands—breaking apart our battalion formations—adds incredible friction to our efforts to maintain that sense of family, particularly among our young engineer Soldiers. It is time for extraordinary measures!

The Army enjoys the support of many fine private organizations. In particular, for many years our Regiment has received outstanding support from the Army Engineer Association (AEA), who has informed me they are shifting their focus in the future to the following areas:

- Providing programs and information geared toward young Soldiers.
- Studying how to better recognize outstanding performance inside our platoon and company formations. One option is by perhaps adding a level of de Fleury below the bronze award that battalion leaders can use to recognize excellence among our youngest Soldiers.
- Exploring ways to take care of our wounded engineers by searching for potential future employment opportunities that capitalize on their engineer skills.
- Exploring ways to take care of the families of our Fallen Engineers by keeping them connected to regimental and unit events, and act as a conduit for getting them any support they need from existing Solider and family support organizations.

I'd like to turn now to a second vitally important initiative designed to honor our family of engineers in a profound way...by honoring the sacrifice of our Fallen Engineers from OEF and OIF. The AEA is proposing, and offering to donate to the installation, a beautiful monument to be erected to honor those engineers who gave their all in support of combat operations in Iraq and Afghanistan. The monument will be made of "Missouri Red Granite" fashioned in a T-Wall design that will bear the names of our Fallen Engineers. This project has received initial approval to be placed in the Engineer Memorial Grove where our Sapper Statue and our tribute to engineer Medal of Honor recipients now stand. Engineer Memorial Grove is where our youngest Soldiers—new entrants into our profession—come to get pinned with the Regimental Crest. It is where many reunions gather to pay tribute to their own...it is a place that I consider the headwaters of our Regiment and profession. This monument has been specifically designed so that additional sections can be added as this war continues; each year at ENFORCE the new names will be added and the Soldiers memorialized. While support for such worthy goals is always voluntary, I am confident the mainstay for support to this effort will come from the Regiment—vice corporate or private sponsorship.

See page 5 for an artist's rendering of the proposed monument. The goal is to unveil the first sets of T-Walls at ENFORCE this April. Essayons! Lead to Serve!

Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School

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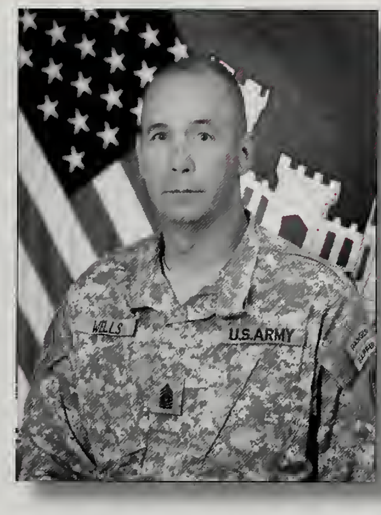


This past year has given us a lot to be thankful for, and not the least is the quality of today's noncommissioned officer (NCO). Grounded in the basics and forged in combat, today's NCO has surpassed our expectations of a leader in today's full spectrum war. It requires a balancing act for an NCO to provide equal attention to his family, profession, and to his Soldiers.

In an Army at war, the leader's spouse assumes a more active role in the mentoring and support of the spouses in the unit. This starts with the platoon sergeant and squad leader spouses ensuring that the young spouses of the platoon are aware of all the programs the Army, post, and local communities provide to support the Army Family: The power, or detriment, of a general power of attorney; the pitfalls of planning your budget to the tax-free duty status of combat; fixing a leaky faucet; fidelity. All of these issues consume the family, and having a close-knit support group takes on significant importance. Participation in the unit's Family Support Group is essential for today's NCO spouse. Young Soldiers and their families need a sense of belonging to a community or a tribe. It makes sense to see the NCO's spouse actively involved in the unit's support group, seeing that about 90 percent of our formations consist of enlisted Soldiers. As the NCO Creed says, all Soldiers (and their families) are entitled to outstanding leadership; I will provide that leadership … I will communicate consistently with my Soldiers (and their families) and never leave them uninformed.

What our Soldiers want to hear from their sergeants is the Army's expectations of them as a Soldier. The NCO serves as a conduit for successful duty as a Soldier. The NCO is the one person in the chain of command who has the ability to counsel and develop every Soldier on an individual basis. The NCO addresses everything from common courtesy and simple everyday chores to the complicated operation of weaponry and everything in between. No task is too trivial for a corporal or a command sergeant major. A good frame of reference is to consider how today's parents are faced with the information age and it's influence on their children's value system—what is considered acceptable behavior in today's world. We see a far wider range of values instilled in the first 18 years of a young Soldier's life than we did 20 years ago. For instance, most of our young Americans bring a civilian workforce mentality into the Army. They believe that they should act like a Soldier on duty, but believe that they can behave any way they please off duty. Our current 7 Army Values are meant to be more than just a bumper sticker. They serve as a guidepost for our development as Soldiers and as decent human beings. It has helped us realize the American dream well before civil society, in that every Soldier is truly created equal.

Today's NCOs have to see their way through the fog of "everything's important" and focus on the more important aspects of this Army: the profession, the Soldier, and the Family.

BASIC FIELD MANUAL
ENGINEER SOLDIER'S HANDBOOK
(This manual supercedes FM 21-105, March 12, 1941)
CHAPTER ONE

1. WHAT IT MEANS TO BE AN ENGINEER –

You are an Engineer. You are going to build bridges and blow them up. You are going to stop tanks and destroy them. You are going to build roads, airfields, and buildings. You are going to construct fortifications. You are going to fight with many weapons. You are going to make sure our own troops move ahead against all opposition, and you are going to see to it that enemy obstacles do not interfere with our advance. You are an Engineer.

2. YOU AND YOUR JOB –

a. You have been chosen to do a man-sized job for the Army and for your country. To do it well, you must keep your eyes and ears open, your mind alert, and always be on your toes. You must keep yourself in top-notch condition. You must become physically tough and an expert at your job. Whether or not our Army succeeds depends a lot on how much better you are at your job than the enemy engineer is at his.

b. That's a large order. The Army knows it is; but the Army also knows that if you give the best that's in you, you will do the job well. You will build, tear down, and fight better than other Soldiers in the world. You will be an American Engineer.

Excerpt provided by 1SG Mike Morris

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer

In the last Engineer Bulletin, I addressed the ongoing improvements occurring in both leader and technical training at the institutional level. I am happy to report that due to the extraordinary efforts of our Directorate of Training and Leader Development (DOTLD) experts and the United States Army Engineer School (USAES) Commandant, the expansion of the 210A Warrant Officer Basic Course (WOBC) from 12 weeks to 26 weeks was approved by TRADOC! This will help bridge the technical competency gap created under modularity and FM 3-0. Our 210A WO1s not only will have the depth of knowledge in one technical area but also will be armed with a breadth of knowledge across three critical engineer areas—survey and design, vertical construction, and the fundamentals of electrical systems and design. DOTLD is aggressively pursuing rapid course development through contract and organic staffing, hiring of term instructors, and securing facilities and equipment upgrades to ensure that the course is ready for an early FY 2012 rollout.

In addition to the approval of the expanded 210A WOBC, the development of the 210A and 215D Warrant Officer Staff Courses, Phase 3, Technical Phase, is well underway. Led by CW4 Angel Martinez, CW4 Phil Mowatt, and CW3(P) Shawn Curtis, the initial Critical Task Selection Board and technical training courses were conducted in September. Both the WOBC expansion and the WOSC Phase 3 development are in concert with the USAES Campaign Plan since they directly support Decisive Points 2-9 and 2-12, Lines of Effort No. 2, and Lines of Engineer Support – Enable Expeditionary Logistics and Capacity. Not familiar with the USAES Campaign Plan? Log on to <*http://www.wood.army.mil/wood_cms/usaes.shtml*>, and then click on the Engineer Regiment Campaign Portal icon on the right pane of the webpage. You'll need to log on with your CAC or your AKO password. Read the commandant's message and review the attached PowerPoint presentations.

In engineer assignment officer news, CW4 Jerome Bussey has replaced CW4 Lee Morris, who was the first 210A to manage engineer warrant officers since the warrant officer division was abolished. We wish him well as he returns to the operational Army as a division staff officer and welcome CW4 Bussey as he tackles the myriad issues affecting engineer warrant officer assignments.

One major issue affecting Army warrant officers is the lack of attendance at professional military education (PME) courses. We are no exception, with only 48 percent of our engineer population attending the Warrant Officer Advanced Course and only 44 percent attending the Warrant Officer Staff Course. We can and must do better. While there may be legitimate reasons why officers are not attending critical PME courses—backlog and deployments, to name two—many officers avoid the courses on purpose. Expect your assignments officer to aggressively push to improve attendance figures. The Army is studying the problem, and in addition to clarifying the latest version of DA PAM 600-3, consideration is being given to making PME in the Active Army mandatory for promotion under AR 350-1. One last thought on attending PME courses—At some point, promotions will slow down; not attending PME courses will become a negative discriminator on future promotion boards. More to follow as the DA G-1 analyzes the issue.

The next engineer warrant officer accessions board will be held from 1–15 January 2010. We are still hiring for both utilities operation and maintenance technicians (210A) and geospatial information technicians (215D). For commanders and warrant officers in the field, when asked for a letter of recommendation, I urge you to only recommend your best NCOs for the warrant officer program. If NCOs are competitive for the SFC board, they will be competitive for the warrant officer board. For more information about the upcoming board or how to become an engineer warrant officer, log on to the Army recruiting website at <*http://www.usarec.army.mil/hq/warrant*>.

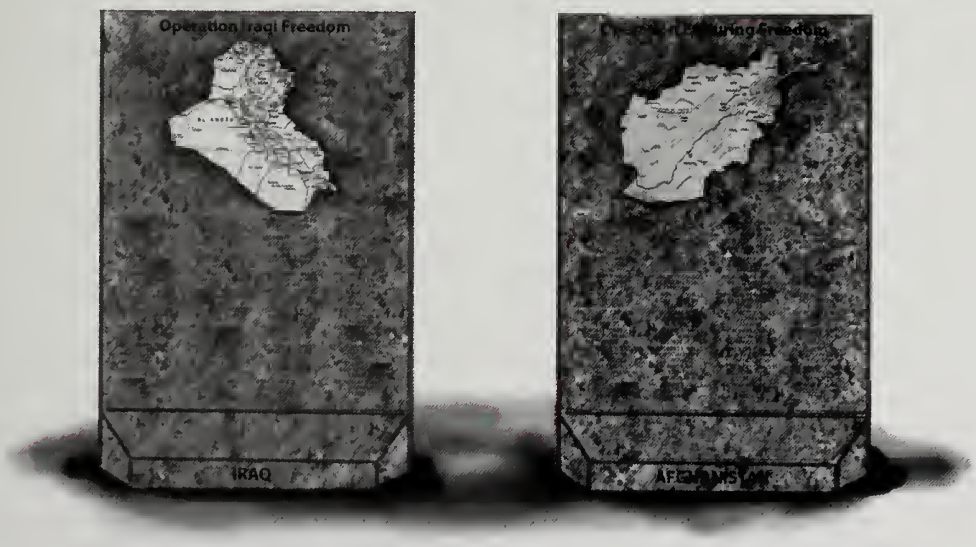
In October, CSM Wells and I visited Fort Polk to participate in an awards ceremony honoring outstanding Soldiers from the 46th Engineer Battalion. I was proud to present CW2 Anthony Jellison with the Active Army Engineer Warrant Officer of the Year award: Truly an amazing performance by this engineer warrant officer. For information about the engineer awards program, go to <*http://www.wood.army.mil/doimspt/phamphlets/htm*>. I will be visiting many Army installations in the coming months, including Fort Belvoir, Fort Bragg, Fort Hood, Fort Knox, Fort Lewis, Fort Rucker, Fort Stewart, and Schofield Barracks. I look forward to seeing many of you as I travel across the country. Until then, stay safe. Essayons!

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*, or were inadvertently omitted from a previous list. We dedicate this issue to them.

Adams, Sergeant Ryan C.	951st Engineer Company, Wisconsin ARNG	Tomahawk, Wisconsin
Espinoza, Staff Sergeant Bradley	3d Brigade Combat Team, 1st Cavalry Division	Fort Hood, Texas
Flores, Specialist Jesus O.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Han, Private First Class Kimble A.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Hill, Specialist Kevin O.	576th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Lawson, Specialist Daniel C.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Lembke, Specialist Eric N.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Meredith, Private First Class William L.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Monroe, Private First Class Jeremiah J.	630th Engineer Company, 7th Engineer Battalion	Fort Drum, New York
Neff, Jr., Specialist Randy L. J.	4th Engineer Battalion, 555th Engineer Brigade	Fort Collins, Colorado
Rimer, Sergeant Joshua J.	4th Engineer Battalion, 555th Engineer Brigade	Fort Collins, Colorado
Stivison, Jr., Staff Sergeant Glenn H.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado
Styer, Specialist Brandon M.	569th Engineer Company, 4th Engineer Battalion	Fort Carson, Colorado

Proposed Fallen Engineers Memorial



One of the highest priorities of the Army Engineer Association (AEA) is to recognize all Army engineers who have given their lives in the defense of the United States of America. Equally important is to recognize those engineers who received wounds in combat resulting in the award of the Purple Heart. AEA is accepting donations to support the design and construction of a Memorial Wall for Fallen Engineers to be located in the "Sapper Grove" at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment. To learn more, go to *<http://www.armyengineer.com/memorial_wall.html>*.

Reflections on Building Great Engineers

By Lieutenant Colonel Paul B. Olsen

Capturing observations has always been part of our military history. Today's engineers are learning historic lessons as our military conducts domestic and overseas contingency operations, and it is imperative that we, as a professional community, capture these lessons for future use. However, the valuable lessons from operational deployments or training exercises often are not captured.

Most United States Army engineers appreciate reading a quality after-action report (AAR) before a project or mission. Our Army knows this and has made significant progress in knowledge management. Indeed, it has been more than 22 years since the establishment of the Center for Army Lessons Learned (CALL), an organization that has amassed an unequaled body of knowledge for the military. Other Services and most Army branches have followed suit. The 249th Engineer Battalion (Prime Power) hosts a collection of electrical lessons learned under *Lion Lessons*, an online body of knowledge named in honor of the battalion's nickname, the Black Lions. With nearly 300 members, *Lion Lessons* is part of the Power and Utilities Operations Professional Forum in the Army's Battle Command Knowledge System.

From field expedient AARs to popular online collaborative sites such as <*www.companycommand.army.mil*>, the official structures for sharing lessons learned still rely on leaders capturing their thoughts and reflections. I have strived to capture a number of observations of military engineering following 20 years of service in the Engineer Regiment, and specifically as the operations officer of the 249th Engineer Battalion, and later as its commander. While the following observations reflect the experiences of a highly specialized unit, I believe they speak more broadly to general engineering and military engineering organizations. Examining lessons learned while serving with some of our nation's most talented military and civilian engineers provides insight into building great engineers.

Observations

Observation 1: Army engineers have always been a full spectrum force.

In Chapter 3 of Field Manual 3-0, *Operations*, is the charge to all field commanders that "the complexity of today's operational environments requires commanders to combine offensive, defensive, and stability [or civil support] tasks."[1] Furthermore, in United States Army Engineer School Commandant Colonel Robert A. Tipton's "Clear the Way" article in the January–April 2009 issue of *Engineer*, we were reminded that " … stability operations require new capabilities and new tactical and technical competencies for engineer Soldiers."[2]

"For years," continued Colonel Tipton, "tasks associated with 'nation building' were to be avoided because [Army engineers] were designed and equipped for high-intensity operations and would only do those other tasks when we had to."[3] The Army's new doctrine suggests a return to the importance of specific engineering disciplines, particularly those used during stability operations. It should therefore come as no surprise that leaders of the Army's more technical engineer formations, such as the prime power battalion, would transition easily to this new doctrine. Indeed, for the past decade, United States Army Corps of Engineers (USACE) engineers and prime power units have regularly conducted missions ranging from providing domestic disaster relief operations to providing power to state-of-the-art antimissile systems.

Observation 2: Mother Nature has a vote.

Over the past two years, USACE has deployed specialized units to support 18 natural disasters in the United States. These missions, which were primarily aimed at restoring essential services to Americans in need, required the USACE prime power battalion to keep a number of its platoons on a ready status. These platoons are specially trained and equipped to conduct electrical assessments for USACE while it supports the Federal Emergency Management Agency (FEMA) as cited in the National Response Framework.

As United States Army Northern Command continues to expand its role in domestic operations, more engineer units (especially in the United States Army National Guard) will be called on to respond to domestic disaster operations. Leaders of these engineer units must develop flexibility in their training management systems as quick-response missions arise. The Army's training management cycle centers on locking in quarterly plans and finalizing training schedules six weeks out. Despite the best efforts of commanders and first sergeants to plan, resource, and schedule training, a lot of patience, flexibility, and discipline are required to reschedule this training following a no-notice domestic disaster deployment.

Being ready with trained forces is essential when Mother Nature has her say, and personal experience shows that keeping four prime power platoons readily available—with the ability to surge as many as eight—is the right mix for providing emergency power during the June to November hurricane season. However, when more than four platoons are required, overseas contingency platoon deployments either must be extended, or required electrical training must be put at risk.

Observation 3: The platoon is the key formation for electrical missions.

The first two observations have used the platoon as an illustration because it is a familiar term, and it is the key formation within the prime power battalion. Composed of only 15 noncommissioned officers (NCOs) and led by a warrant officer and a master sergeant, the prime power platoon is unique compared to typical Army engineer platoons. Whereas most platoons are led by a lieutenant and a sergeant first class, the technical complexity of the electrical mission, coupled with the unpredictability of mission occurrence, in truth warrants a warrant officer. Similarly, due to the independent operations required of the prime power platoon, there is no substitute for the experience that comes with a more senior NCO, who regularly must perform the duties of a first sergeant when deployed.

So independent and versatile are these engineer platoons that they are often referred to as "detachments," which may be more descriptive of their modular nature, or as "power stations," a title that gives civilian engineers a better appreciation of their technical function. Regardless of which term is used, there is no better formation than the platoon to conduct worldwide military electrical operations, because it contains the talent and experience needed to accomplish every assigned mission.

It is therefore extremely unfortunate that so few formations exist that are composed purely of engineers of a technical trade group. It is not my intention to take away from the enormous capability within our nation's other engineer formations, but if military engineers are unable to mass our technical skills into formations like platoons and companies, then we will fall short of accomplishing large-scale improvements to infrastructure when called upon. I believe our military would be well served by growing more technical engineering platoons and companies for specific use in conducting "industrial strength" infrastructure missions. Clearly, there are advantages and disadvantages that stem from specialized units, which lead to the next observation.

Observation 4: One is the loneliest number.

The exhilaration of leading the nation's largest formation of military electrical engineers was tempered by the challenge of having led one of its most unique formations. The vast majority of the Army's battalions are subordinate to brigades, divisions, and corps. Due to its unique mission, the Army's prime power battalion reports directly to the commanding general of USACE. The advantages that come with a comparatively independent command are many, but they must be weighed against the disadvantages of managing the complex tasks associated with brigades, divisions, and corps. These include Base Realignment and Closure Commission moves, military construction planning, global communications issues, United States Army Prime Power School (USAPPS) curriculum development, and a host of other tasks. For the most part, these challenges foster a sense of empowerment in subordinate leaders and staff members since senior leaders tackle tough issues such as deployments, restationing, and the construction of new facilities. However, relatively junior officers and NCOs are also tackling tough issues such as the development of power production units for multibillion dollar programs—such as the Theater High-Altitude Area Defense System (THAADS) and Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) System—without the assistance of higher-level engineer staffs.

Additionally, a specialized unit often attracts missions tangential to its training because the unit represents the best possible match to meet the requirement. Military

USACE Soldiers provide power to a shelter during disaster relief operations.

planners know this, but are faced with the fact that there are few in-house alternatives readily available.

Task Force SAFE (Safety Actions for Fire and Electricity), the Army's 2008–2009 project to prevent the accidental electrocution of Servicemembers in Iraq, illustrates the challenge. Through the impressive teamwork with the United States Army Materiel Command and USACE, a professional force of more than 100 individual master electricians deployed to theater. However, this force took 90 to 180 days to form, so the initial response by USACE was a prime power platoon. The fit wasn't perfect, and the prime power production specialists required three intense weeks of low-voltage bonding and grounding training before conducting inspections. But their results were impressive, with the platoon completing more than 7,000 electrical compliance inspections, which helped to eliminate additional fatal electrocutions during their time in Iraq.

A quicker and more suitable response might have been to consolidate all the interior electricians assigned to engineer formations already in-theater. These formations could have provided their commanders with a more immediate force to inspect electrical contract work in their areas of operation.

Observation 5: Building great military engineers requires great learning organizations.

To lead a true learning organization, military engineers must be able to influence the development, education, and application of their engineering trades and then be able to make adjustments throughout the entire organization in a cyclical process that must be repeated endlessly. This relationship exists within USACE, where the commandant of USAPPS is also the commander of the Army's prime power battalion. This is an effective relationship, because that officer is able to orchestrate the development of prime power doctrine, the instruction of that doctrine at the school, and the immediate application of this instruction within the battalion. After cycling the resulting lessons learned back into the system, the organization "learns," subsequently building great military engineers.

For example, an AAR written by a prime power battalion platoon leader suggested that his new platoon members, recent USAPPS graduates, were uncomfortable operating the battalion's main medium-voltage generator. A review of the school curriculum revealed an unbalanced emphasis toward Cold War-era models common to industry. The curriculum was adjusted to add a capstone exercise near the end of the course, and all companies in the prime power battalion now report heightened generator readiness.

Observation 6: It' s not what you think; it's how you think.

It is often said that a military trains for certainty and educates for uncertainty. This truism especially applies today to military engineers as they conduct contingency operations. Skilled engineers, capable of thinking on their feet, are essential during simultaneous offensive, defensive, and stability operations. The battlefield and disaster area successes attributed to our military's prime power engineers are not merely a result of the technical training they receive at USAPPS but also stem from insight that comes with the academic study of physics. Indeed, fully one-third of the school's curriculum is dedicated to the study of mathematics and physics. From this, students understand that the physical world follows a set of laws, and when these laws are internalized, one can master physical concepts such as electricity for immediate application during unpredictable contingency operations. I believe this level of education is best provided by civilian professors and instructors who concentrate on engineer theory (*how to think*), not military training (*what to think*).

To continue to build great electrical engineers across our military, it is also essential to provide young military engineers with continuing education opportunities after graduation from their initial technical training. At the unit level, commanders must plan and resource programs that allow engineers to attend professional association-led training, or trade schooling, with full funding before heading back to technical units for immediate implementation. As with a civilian power company, continuing education is money well spent.

Military engineers must also strive to retain small-unit integrity. Then the time-honored master-apprentice relationship that enables the building of trained and educated engineers for our military will emerge among senior and junior engineers in a unit.

Observation 7: Military engineers are a national asset.

Our military engineers, both in and out of uniform, must be seen as a national asset, and the role of leaders during a crisis is to get them to the decisive place at the decisive time. One of the objectives of the 11 September 2001 attacks was to disrupt our nation's economy. A prime power production specialist arrived in New York from Fort Belvoir, Virginia, within 36 hours of the attack. Sent as part of the USACE initial response, that Soldier directly coordinated with military and civilian leadership and was asked to immediately report to the FEMA director about the utilities powering the three major stock exchanges. His report was later used by President George W. Bush to announce the reopening of those markets.

Prime power production specialists have also proven themselves as a significant counterinsurgency (COIN) weapon. Insurgents aim to discredit governments by disrupting the supply of basic services to the population, so providing those services—especially electricity—is an essential COIN countermeasure. Prime power production specialists, acting as part of Task Force Gold in 2008–2009, provided emergency power to Baghdad's Sadr City, raising the public's trust in the new Iraqi government.

Observation 8: Neither electrons nor insurgents care.

Leading a tactical unit of specialized electrical engineers presents challenges from two deadly threats—the electron and the insurgent. Military electrical engineers must continually weigh the threat of electrocution against the threat of combat and take the proper countermeasures. It's a balancing act of knowing when to don personal protective equipment (PPE) and when to employ a more tactical uniform and equipment. For example, during movement to a reconstruction project such as an energized electrical substation in Sadr City, the uniform should match that of the security force. However, once on the project site, the electrical engineer assumes more risk from his metallic assault rifle and body armor than from the potential small arms fire of an insurgent. In this case, the tactical uniform should be replaced with the appropriate PPE. As Iraq continues to stabilize, this precaution will become more and more prevalent.

It is instructive for military engineers of all trades to apply this lesson to other areas where regulations are in place to protect our safety and equipment. There must always be allowances made for PPE over tactical equipment when the trade risk is higher than the tactical risk.

> ***"To continue to build great electrical engineers across our military, it is also essential to provide young military engineers with continuing education opportunities after graduation from their initial technical training."***

Observation 9: Forget the process; get after the problem.

As stated previously, the prime power battalion's emergency deployment to Task Force SAFE was not part of the unit's approved mission statement, and the majority of the tasks conducted during that deployment were better suited for the interior electricians assigned throughout the Services. However, hiding behind doctrinal separations has never been part of the Engineer Regiment's mind-set. A great example was the combined actions of three NCOs who assessed the infrastructure of the Haiditha Dam on the Euphrates River. Rather than ask who was responsible for the dam, the team repaired a backup generator that ultimately restored 200 additional megawatts of reliable power for Baghdad.

Indeed, there are scores of examples of military engineers departing from the constraints of their job and duty descriptions and getting after the real problems of restoring Iraqi and Afghan infrastructure.

Observation 10: Generators are not critical; knowledge is critical.

This observation may appear bizarre coming from a former prime power battalion commander, but I have found it to be true time after time. The battalion's active and war reserve generator fleets are rarely used because contracted power is less expensive, easier to deploy, and more efficient if properly monitored by a qualified military engineer. Given this fact, and the reality that there is not a "one-size-fits-all" power generation package, our military electrical engineer's most valuable skill set is the ability to efficiently plan, execute, and oversee these temporary multimillion-dollar power contracts for specific purposes. The same may be suggested for other technical engineering fields such as water purification and computer networking.

Across our entire government, I see a need to provide engineers and technicians to oversee general and technical engineering contracts including—but not limited to—sewer, water, wastewater, and telecommunications. This is a lesson learned following the devastation wrought by Hurricane Katrina.

Observation 11: Reconstruction and disaster response are painfully similar.

It is striking that the majority of the skills required for reconstruction during overseas contingency operations are the same as those required for domestic disaster responses. The major difference is the source of the destruction to the infrastructure—human as opposed to Mother Nature. For electrical engineers, the jobs performed during Hurricane Katrina reconstruction were the same as those done in Sadr City: electrical load assessments, generator installations, substation maintenance, and others.

The Department of Homeland Defense has a wonderfully comprehensive plan that it uses for disaster response and recovery operations. It also has a similar recovery operations plan for overseas contingency operations authored by the Department of Defense and Department of State. Given the similarity of tasks such as providing water, ice, roofing, and emergency power, it stands to reason that an interagency exchange of lessons would prove valuable for senior government leaders.

Observation 12: Military engineers must remain with the energy vanguard.

We must be ready to employ renewable energy sources, but the real cost savings will come from working our current power infrastructure more efficiently. In Iraq, military engineers are exploring linking solar panels and wind turbines into existing power grids through the use of dormant transformers. They are also partnering with industry to attach fuel cells to our generators. The fuel cells can charge while the generators are running below optimal load, thus avoiding running the generators at a low-load percentage, which has long-run negative effects. The fuel cells would then be discharged while the generators were powered down.

In Afghanistan, fuel cells, solar arrays, and wind turbines show great potential, but the fact remains that all of this equipment must travel through the dangerous Khyber Pass. The safer and more efficient approach would be to optimize our current power generation and distribution methods on enduring bases through better contract oversight. Consider a quote by an executive with an energy management company: "If grocery stores ran like power companies, one would walk down the aisles and there would be no prices on anything. You would fill your cart, get home, and 45 days later you'd get a bill that had a single number on it."

That quote points to the cost of powering diesel plants in Iraq and Afghanistan where we are paying for our power without fully realizing what we are purchasing. On Victory Base in Iraq, for example, I estimated that if the various low-voltage generators (often called *spot generators*) were taken offline and the grid were powered by the central power plants already in place, thousands of 5,000-gallon tankers could be taken off the road and more than $180 million could be saved annually. These types of efficiencies could be realized throughout our theaters through the elimination of spot generation on enduring bases in favor of centralized power plants.

Conclusion

The twelve observations in this article are designed to serve as topics of discussion in military and civilian engineering forums. Although they are presented as individual observations, many are related. They represent a number of truisms that have emerged among the leaders in our community who have served as Black Lions. They are also well in line with meeting the strategic message of the Chief of Engineers, who reminds us that we are "Building Strong," as well as the Engineer School Commandant, who has charged all leaders with the task of "Building Great Engineers." These two challenges have a common thread—a return to educating military engineers in various technical disciplines while preserving the leadership competencies that have allowed our Corps to prevail in both peace and war.

Lieutenant Colonel Olsen commanded the 249th Engineer Battalion from 2007 to 2009 and is now assigned to the Army Staff, Office of the Chief of Engineers, as Chief, Operations Branch. He holds master's in business management and civil and infrastructure engineering and is a licensed engineer in Virginia. He can be reached at <paul.b.olsen@us.army.mil>.

Endnotes

[1] Field Manual 3-0, *Operations*, 27 February 2008, p. 3-1.

[2] Colonel Robert A. Tipton, "Lead the Way," *Engineer*, January–April 2009, p. 2.

[3] Ibid.

BUILDING GREAT ENGINEERS AT ILE: FORGING FIELD GRADE SUCCESS

By Mr. Jonathan M. Williams

> *Educates and trains field grade officers to be adaptive leaders, capable of critical thinking and prepared to operate in full spectrum Army, joint, interagency, intergovernmental, and multinational environments.*
>
> *—Command and General Staff College Mission Statement*

Engineer Skills in an Era of Change

In an era of seemingly constant change, engineer leaders at all levels are challenged to quickly adapt to their operational environment. Nowhere is this challenge more pronounced than at the field grade level, where the modular headquarters of brigades, divisions, and corps operate much differently than in the past. Commanders and staffs who conduct operations from these headquarters rely heavily on the digital command and control systems to fully understand, visualize, describe, and direct activities across the full spectrum of operations. However, more important to the success of these units is the intellectual power of the field grade officers—including engineers—who are responsible for the bulk of the situational analysis in these headquarters. Hence, the professional training and education of engineer majors serve a crucial role in the success of the United States Army.

Each year the Army sends approximately 50 to 60 engineer officers to Fort Leavenworth, Kansas, for Intermediate Level Education (ILE) at the Command and General Staff College (CGSC). As part of the CGSC program of instruction, engineer officers are challenged to complete the six-month Advanced Operations Course in addition to the four-month core course. Throughout the yearlong resident study, engineer officers spend significant time honing their particular expertise as field grade officers.

A faculty member at CGSC briefs ILE engineers at a recent Engineer Branch officer professional development session.

Engineer officers at CGSC participate in a division planning exercise.

Even while embracing the constant changes throughout the Army and in the operational environment, the ultimate goal of the Engineer Branch training at ILE has remained the same—to produce the finest field grade engineer officers in the world and prepare them for continued service in the Engineer Regiment.

To this end, the CGSC faculty has worked hand in hand with the United States Army Engineer School and the United States Army Maneuver Support Center of Excellence at Fort Leonard Wood, Missouri, and the officers themselves to create broad opportunities for engineer majors to enhance their individual skill set while at CGSC. The current Engineer Branch training program has evolved over the past five years, reflecting the operational environment and the changing engineer force structure. The engineer officers share curricular and extracurricular sessions with fellow engineers from many of the installation's diverse communities, to include the—

- Precommand Course.
- School for Advanced Military Studies.
- Battle Command Training Program.
- United States Army Corps of Engineers, Kansas City District.
- CGSC faculty.

Engineer Branch Training Program

While there are important points in the ILE curriculum where Engineer Branch experience is essential to the learning experience, much of the branch-specific training takes place outside the formal curriculum in informal settings such as brown-bag lunches and officer professional development (OPD) breakfasts. Given the impressive operational experiences and diverse backgrounds of the engineer officers at ILE, the Engineer Branch training program easily accommodates a wide variety of topics, in many cases using the students as discussion leaders in a learning model similar to graduate school. This approach has allowed great flexibility in scheduling and fostered a strong bond among engineer officers who otherwise would have limited opportunity to spend time together due to differences in seminar group schedules.

There are also opportunities for specific engineer training at ILE in the form of the Advanced Application Program (AAP), which offers student-chosen electives that include several topics with a strong engineer emphasis, such as the maneuver enhancement brigade, geospatial intelligence, and independent study of tactics. The courses allow officers to focus on an area of particular interest to themselves, such as preparing to take the professional engineer exam or attending the Joint Engineer Officer Course at Fort Leonard Wood. These AAP courses, coupled with the robust extracurricular program, offer engineers unique options to prepare themselves for immediate assignments as well as long-term leadership of engineer formations throughout the rest of their careers.

Key to the success of building great engineers at ILE has been the role of the student-led Engineer Steering Committee for each year's class. The engineer officers who volunteer to be on the steering committee work with the CGSC engineer faculty to design a dynamic professional development program that is uniquely suited for the affected engineer officer population. The steering committee plans, coordinates, and executes each of the engineer activities based on the college schedule and works to offer topics and activities of interest to the entire engineer CGSC population.

Not Your Daddy's CGSC

Another important factor in the Engineer Branch training is the significant amount of combat experience the CGSC engineer officers possess. More than 75 percent of them have served in combat in Iraq or Afghanistan and almost two-thirds of the officers have multiple combat deployments. Given this impressive experience, one key feature of the Engineer Branch training program emphasizes having the engineers share their unique perspectives in a casual yet structured setting. The many lessons learned and tactics, techniques, and procedures developed become powerful points of discussion inside and outside the classrooms and serve to unite the officers in a special way. Engineer officers routinely serve as OPD discussion leaders on such topics as counter improvised explosive device and route clearance operations, base construction and repair, field force engineering, and terrain visualization/geospatial intelligence.

Collaboration Among Engineers

The ongoing Engineer Branch training program at CGSC has also benefitted extensively from support from other organizations and other parts of the Engineer Regiment. For example, for the past seven years, the National Geospatial–Intelligence Agency (NGA) has sent support teams to CGSC during the ILE exercises to simulate the role of the operational support teams that are part of the corps and division headquarters during deployments. Besides producing a variety of high-quality terrain and imagery products, these teams serve as a conduit through which national-level resources trickle down to the tactical units on the ground. These NGA specialists have proven invaluable to the quality of the CGSC exercises and have contributed greatly to the education of the officers at ILE, especially the engineer officers who are usually viewed as the terrain experts within their staff groups.

Another effective initiative is a collaborative website for engineers within the CGSC local area network's student SharePoint site. The engineer officers and faculty all contribute to the site and can share engineer-specific information across the college quickly and easily. This repository serves as a one-stop ready reference for the engineer students and contains extensive files on engineer force structure, doctrine, operations, and materiel. Perhaps even more important is that it allows the engineer officers to remain current with the latest available information so they can provide individual expertise to their assigned staff groups and can truly be the branch experts they are required to be.

There is also frequent interaction between the engineers at CGSC and the civil side of the United States Army Corps of Engineers, promoted largely by the Kansas City District office. The district commander has conducted OPD sessions each year with ILE students and has also facilitated briefings by the district's higher headquarters—the Northwest Division—for the most recent class. Coupled with the Kansas City, Missouri, chapter of the Society of American Military Engineers, the district headquarters has sponsored several programs specially tailored to the engineer majors at CGSC.

Sustaining the Momentum

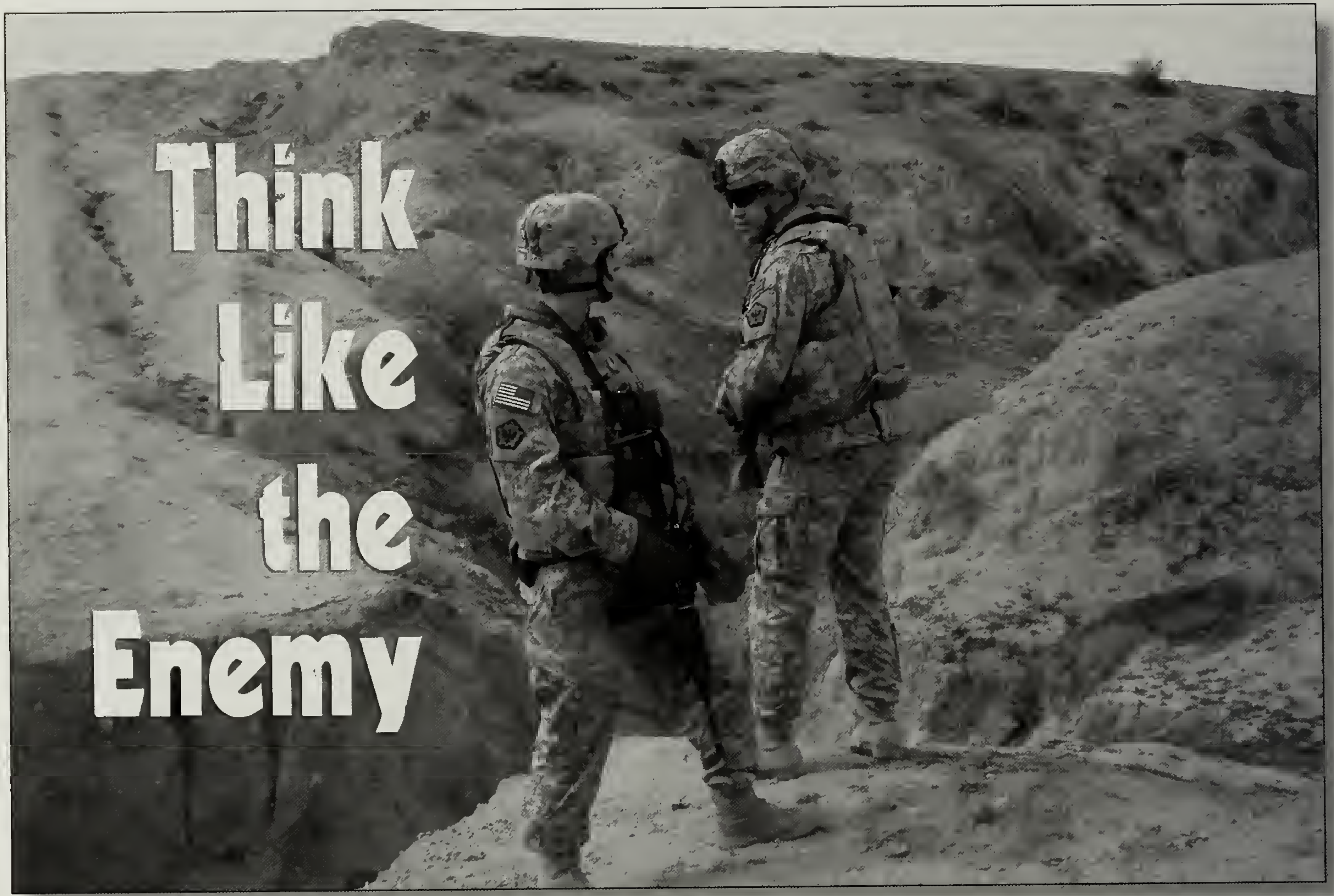
Lieutenant Colonel John E. Byrn, a CGSC faculty member in the Center for Army Tactics (CTAC) and the current Engineer Branch subject matter expert for the college, has overseen the evolution of the program and says it has contributed to the quality of the education for the engineer officers. He believes that the value of these opportunities is complemented by support from engineer organizations and leaders.

Brigadier General Ed Cardon, the deputy commandant of CGSC, understands the crucial role the Engineer Branch program plays in the education of the CGSC officers. He believes that the opportunity for engineer officers to both learn and connect at CGSC has lifelong value. The education will enable their thinking and approach to solving complex problems in the future, and the connections will help sustain them—both professionally and personally—for the remainder of their careers.

The engineer officers who attend ILE at Fort Leavenworth each year constitute a significant portion of the Regiment's field grade officers. The skills and leadership they bring to the fight are invaluable. Making sure that they have the optimal opportunity to prepare themselves for their return to the formations remains the driving force behind the CGSC's Engineer Branch training program. At Fort Leavenworth, building great engineers is not just a slogan; it's an everyday commitment.

Mr. Williams is an assistant professor with the CTAC at CGSC, where he has taught for nine years. He retired after 22 years of active duty service as an engineer officer, including assignments with the 197th Infantry Brigade; the 132d Engineer Brigade; the 36th Engineer Group; the 1st Cavalry Division; III Corps; the United States Army Engineer Center, Fort Leonard Wood; and the Multinational Force and Observers, Sinai, Egypt. He also served as an instructor at the United States Military Academy at West Point, New York. A distinguished military graduate of the University of Mississippi, Mr. Williams holds master's from the University of Alabama and Webster University.

Think Like the Enemy



By Captain Alan R. Mackey

Almost everyone in the military has heard the advice to "think like the enemy." The saying probably originated with one of the most influential military strategists in history, Sun Tsu, who wrote in *The Art of War*, "If you know your enemies and know yourself, you will not be imperiled in a hundred battles; if you do not know your enemies but do know yourself, you will win one and lose one; if you do not know your enemies nor yourself, you will be imperiled in every single battle."

This is one of the age-old bits of wisdom I kept in the back of my mind, but never thought about too seriously. I first became familiar with the saying during four years as a cadet and then reflected on it more often during my two and one-half years as a lieutenant. It was not until recently, while serving in Iraq, that I gained new respect for its validity. As a combat engineer platoon leader, I adopted the principle of never following a daily pattern. In my platoon, we constantly change our formation, speed, and order of march. But that was the extent of my efforts to throw the enemy off. My battalion commander liked to say that people learn through one of two ways: through repetition or

Soldiers clear a road in Iraq.

After 5th Engineer Battalion Soldiers find an IED, Iraqi police question local townspeople.

because of a significant emotional event. My recent awakening was the result of the latter.

My platoon operated mainly from a camp in eastern Iraq. Our mission for the past month had been to clear an unimproved road in support of Iraqi civilians working on a nationally significant oil pipeline used to transport crude oil from the region bordering Iran to a refinery in Baghdad for processing. The enemy had previously emplaced antitank mines and improvised explosive devices (IEDs) along this route to disrupt progress in repairing and maintaining the pipeline. Each day, the workers transported construction equipment to the pipeline to make any necessary repairs to damaged sections. Our route clearance allowed the workers to travel safely to their job sites and get their work done.

On the first day we cleared the route, workers built an expedient ramp to help download their construction equipment. That day we cleared the route and the workers were able to complete a full day of work. Later that evening, my platoon sergeant suggested that insurgents might place an IED in that ramp during the night. The suggestion made sense, and during the mission brief the following morning, we decided to clear the ramp before moving to the next section of the route, which was 75 meters away. When the platoon arrived at the ramp, the Husky mine-detection vehicle operator scanned the area and, on his second pass, identified a possible threat. As he backed up, he saw a wire leading out of the dirt, used the Husky's ferret arm to interrogate the area, and soon pulled up an IED. Once it was safe, we continued our mission for the day.

If we had not cleared the ramp, the Iraqi pipeline workers would have used it again to download their equipment and almost certainly would have triggered the mine, causing damage to equipment and possibly inflicting casualties. My platoon sergeant's use of an idea that has been a constant theory in military history may have saved the lives of others. Because of this, we ask our Soldiers to "think like the enemy" on a daily basis. We no longer say it just because it sounds good; we say it because it works. Leaders from the team level up should seek the advice of their Soldiers and peers. Leaders will be amazed at the ideas presented and the advantages gained if they use the knowledge that is available from their Soldiers. It has been my honor and privilege to lead some of America's finest young men in combat. They will impress you on a daily basis—if you let them.

Captain Mackey was a platoon leader with the 55th Mobility Augmentation Company, 5th Engineer Battalion. Previously, he was the executive officer for Charlie Company, 2d Battalion, 10th Infantry Regiment, at Fort Leonard Wood, Missouri. He is a graduate of the United States Military Academy and is scheduled to attend the Engineer Captains Career Course at Fort Leonard Wood in January 2010.

Technical Engineering Skills Improvement Initiative

By Captain Bridget A. Strom and Captain Jonathan L. Wilson

The 1st Armored Division (1AD) and the United States Army Corps of Engineers (USACE) European District teamed up to create a Technical Engineering Skills Improvement Initiative (TESII) that temporarily placed junior officers from 1AD's Division Engineer section in the European District to develop the officers' technical engineering skills. Experience in Operation Iraqi Freedom (OIF) 07-09 in Multinational Division–North demonstrated that our maneuver "customers" required this technical engineering expertise from their supporting engineers. This experience also clearly illustrated that our current junior officer professional education and developmental assignments are insufficient to provide the officers the required technical skill set, necessitating initiatives such as the one outlined here.

The objective of the 1AD/European District TESII is to provide engineer captains the opportunity to learn and practice technical engineering with an emphasis on hands-on project, program, and construction management work. These skills can then be carried back to the Division Engineer section for use during overseas contingency operation deployments.

This program is ideally conducted during the training period before a unit's deployment in order to train engineer captains on the skills required in both Iraq and Afghanistan. To initially test the program concept, the authors—who had deployed with 1AD during OIF 07–09—were placed with the European District as a proof-of-principle exercise to see if the developmental opportunities in the District were indeed applicable to the technical engineering requirements they experienced during the deployment. During this trial run, the 1AD engineer captains worked with multiple sections within the District, but spent the majority of their time working within the District's Installation Support Branch (ISB).

The ISB is a subbranch of project management within the European District that provides project management support for particular types of fast-order contracts to expedite those smaller, regularly occurring projects. It is the responsibility of the project manager to receive the project request from the client; manage planning and design; coordinate with the contractor; develop a project scope of work (SOW) and complete project packet; submit for bidding; award and monitor project construction; and follow each project through to completion. The project manager is the overarching coordinator on each project. The ISB acts as an extension to the Department of Public Works (DPW) for garrisons in Europe, supplementing them on projects beyond their capabilities; when the DPW cannot handle a project, they pass it off to the ISB. The ISB specializes in the implementation of projects through job order contracting (JOC) and multiple-award task order contracting (MATOC). These are large blanket contracts similar to indefinite delivery/indefinite quantity (ID/IQ) contracts, which are intended to cover repetitive projects. Beyond the benefits of learning project management skills, the District has a multitude of other sections that can provide relevant experience for deploying engineers: contracting, large-scale project management, environmental management, engineering and construction, program management (not to be confused with project management), and work in the various area and resident offices.

At the end of the initial four-month trial run, the authors were convinced that the skills and experience they gained while working in the European District would have been excellent preparation for the missions and tasks they executed in support of Multinational Division–North as part of 1AD's Division Engineer section during combat operations. They found that the fast-paced work that the ISB performs was the ideal working environment in which to train the technical engineering skills junior officers need. Given this, as the summer cycle of officer moves took place, the new 1AD commander gave approval to formally continue the program by placing two new engineer captains, fresh from the Captains Career Course, into the TESII program in preparation for 1AD's next deployment.

Overall, we strongly advocate that other divisions employ a similar strategy to train their junior officers. The technical engineering skills they gain and the understanding of USACE operations will serve the division well during a deployment. It is a "no-cost" or "low-cost" solution to fill a capability gap in the professional education of our junior officers. Although the close proximity of the 1AD headquarters to the European District headquarters in Wiesbaden, Germany, greatly simplified the logistics of this initiative, it is our belief that a similar arrangement between the CMS officers of a Division Engineer staff section and a local USACE area or residence office could take place at many posts, even where the District headquarters is located beyond a typical commuting range.

Captain Strom, currently with the 2d Infantry Division, Uijongbu, Korea, has also served in engineer positions in both the 130th Engineer Brigade and the 1st Armored Division in Germany and Iraq. She is a graduate of the United States Military Academy.

Captain Wilson, now in the 2d Infantry Division, Uijongbu, Korea, has also served in both the 130th Engineer Brigade and the 1st Armored Division in Germany and Iraq. He is a graduate of Vanderbilt University.

MASTER'S DEGREE OPPORTUNITIES FOR RC ENGINEER OFFICERS

By Major Terry A. Saul

On 24 September 2009, Webster University and the United States Army Engineer School put the final signatures on an agreement to extend the current cooperative degree program between Webster University and the Engineer School to include Reserve Component (RC) officers who complete the Engineer Captains Career Course–Reserve Component (ECCC–RC) course. Since 2001, the Engineer School has partnered with Webster University to give officers the opportunity to earn a master of public administration (MPA) degree while attending the Engineer Captains Career Course (ECCC). Officers are granted 15 hours of graduate credit for satisfactorily completing ECCC, which is applied against the 36-hour requirement for the MPA. ECCC students have also attended classes at Webster and were allowed to remain at Fort Leonard Wood on permissive temporary duty for up to 10 weeks to complete the remaining 21 credits required to earn a master's degree.

Now, RC officers who complete ECCC–RC are granted 15 hours of graduate credit toward an MPA at Webster University. The MPA must be taken in residence at one of Webster's 100 worldwide campuses. To find a campus near you, visit Webster online at <*www.webster.edu*>. In addition to the 15 hours toward the MPA, this addendum expanded the current agreement to include two online programs. Graduates of both ECCC and ECCC–RC can now receive 12 hours of graduate credit toward a master of arts in management and leadership (MML) or 9 hours of graduate credit toward a master of business administration (MBA).

Colonel Patricia Ryan (left), Chief of Staff, Maneuver Support Center of Excellence–Army National Guard; Brigadier General Bryan G. Watson (center), Commandant, United States Army Engineer School; and Colonel Jennifer L. Curry (right), Chief of Staff, Maneuver Support Center of Excellence–United States Army Reserve, sign the agreement to extend the Cooperative Degree Program to Reserve Component Officers while Mr. Ralph Southard, Webster University/ECCC–RC coordinator, observes.

- ***Who is eligible to participate?*** This program will apply to all students graduating from the ECCC–RC from Class 01-08 until the program is terminated.
- ***How can you get started?*** Prior to course enrollment, officers are required to make application and gain admittance to Webster according to its admissions policies. Admission criteria for ECCC–RC students will be the same as for traditional Webster graduate students. Next, officers need to request through the United States Army Maneuver Support Center registrar's office, 573-563-7965, that a final Department of the Army (DA) Form 1059 (Service School *Academic Evaluation Report*) for ECCC–RC be sent to <*rsouth @webster.edu*>, Webster University/ECCC–RC Coordinator, at Fort Leonard Wood, Missouri, to receive credit. For further information, call the ECCC–RC coordinator at 573-329-6777. **Note:** No credit will be granted for students who failed to meet academic course requirements or course standards or did not maintain an overall average of 80 percent. This will be annotated on their final DA Form 1059 issued on completion of ECCC–RC.

Officers will be afforded the opportunity to use tuition assistance and GI Bill payments for costs associated with Webster Admissions and Webster University Online Programs, according to applicable United States Army, United States Army Reserve, and Army National Guard policies for graduate education tuition and fees accrued by participating in this program. ECCC–RC officers interested in one of these master's programs may contact Major Saul at <*terry.saul@us.army.mil*> or (573) 563-7026.

Major Saul, an Army National Guard officer, is the Chief, Engineer Captains Career Course–Reserve Component, at Fort Leonard Wood, Missouri. He holds a bachelor's in business management from the University of Southern Mississippi and is pursuing a master's in public administration from Webster University.

EXPLOSIVE HAZARDS TEAM:

Concept, Employment, and the Way Ahead

By Captain Glen A. MacDonald

The United States Army is better prepared for contingency operations today than ever before. What was a rigid Cold War-era formation only eight years ago is now a modular force capable of tailoring combat "packages" to the specific needs of an operation. The Engineer Branch has historically provided one of the most diverse skill sets to combatant commanders. Through its transformation to a modular force, this skill set has grown in scope and functionality. The Engineer Branch remains an example of doctrinal adaptation and change. Engineers can be proud of the branch's efforts to modify the force—specifically at the company level—where combat engineers specialize in a number of new formations such as mobility augmentation, clearance, and sapper companies. However, the establishment and employment of formations such as the facility engineer team, explosive hazards coordination cell (EHCC), and explosive hazards team (EHT)—all captured in revised engineer doctrine—lag behind doctrine and original intent.

The EHT—one of the newest, smallest, and most misunderstood units on the battlefield—has groundbreaking functions and doctrinal capabilities for the Engineer Branch and the Army's modular capability as a whole. The EHT combines explosive ordnance disposal (EOD) and engineer capabilities into a single entity for the first time. However, although the concept of fusing EOD and engineer capabilities remains valid, the teams are not being properly employed in Iraq. This article addresses the original EHT concept as captured in doctrine, describes how the teams are currently employed, explains why they are not being used doctrinally, and concludes with recommendations for the future. The Engineer Branch must make some serious decisions about the EHT before time runs out on the concept.

Original EHT Concept

As early as 2003, the Engineer and Ordnance Branches began formulating plans for the EHT through the Fort Leonard Wood, Missouri, EOD Fusion Cell. As the improvised explosive device (IED) threat continued to skyrocket in Operation Iraqi Freedom, the EHT concept slowly crystallized, ultimately being captured in doctrine and published in 2007.

A pair of field manuals provided early guidance and insight into the conduct of an EHT. Published in a race to keep doctrine relevant to ongoing combat operations, the documents do not provide the detail expected of United States Army doctrine. In fact, due to discrepancies in the discussion of EHTs, the manuals may prove more confusing than helpful. However, the reality of the fight necessitated action, and the new manuals, even if flawed, lay the conceptual groundwork for an EHT. Teams were needed, and in 2007 the first EHT was born.

The EHT is a modular group organized under an engineer battalion headquarters in garrison and employed primarily at brigade level and below in combat operations. It can be organized at other echelons of command based on—

- Maturity of the theater.
- Explosive hazards threat.
- Counter-IED (C-IED) operations.
- Route clearance operations.

Employed at any level, it functions as the first doctrinal fusion of EOD and engineer effort. Slots on the team are filled by Soldiers with EOD and engineer military occupational specialties. This is not the first time Soldiers of these two skill sets have worked together, but it is the first time such a relationship has been codified in doctrine. This combination of skills would allow the team to meet some unique needs and fill capability gaps identified during the War on Terrorism.

In an immature theater, there is significant need to catalogue ammunition supply points (ASPs); major cache sites; explosive hazard trends; and subsequent clearance, reduction, and mitigating tactics, techniques, and procedures (TTP). The EHT plays a significant role in filling this gap, acting as the eyes and ears of an EHCC (another new organization) as it builds and manages a comprehensive theater explosive hazards database. Both organizations, working together, play a crucial expeditionary role in this responsibility. However, in a more mature theater such as Iraq in 2009, the EHT role crystallizes around support of the C-IED fight at the engineer battalion level of command and control.

Historically, engineer route clearance operations resulting in an IED find and EOD actions at the site are at opposite sides of a capability gap where these linked activities are not efficiently synchronized. Engineers who find an IED while clearing routes regularly must wait for

EOD response, and it became obvious to both communities that there must be a smarter way of doing business. This theater-specific disconnect between two branches involved in the C-IED mission is the second major gap the EHT was designed to fill.

EHT employment, manned jointly by engineer and EOD Soldiers as called for in doctrine, would reduce time on target for route clearance, EOD, and maneuver security personnel at IED find sites. It would provide concentrated explosive hazard collection capability for IEDs, caches, and ASPs through liaison with an EHCC. And finally, engineer and EOD Soldiers would be cooperating as equal parts of the solution to a tactical problem. These were the great intentions behind the creation of this new capability within the Engineer Branch. However, due to the long fielding process, friction between the Engineer and Ordnance Branches, and a lack of theater understanding of the EHT concept at the time of its arrival, this capability has yet to be realized and may already be destined to fail.

School and Experience Requirements for Explosive Hazards Team Members

Schools (Fort Leonard Wood)						Schools (Iraq, Kuwait)			Previous Combat Experience		
Explosive Ordnance Clearance Agent	Route Reconnaissance and Clearance Course-Sapper	Counter Explosive Hazards-Planner	Improvised Explosive Device Defeat-Train the Trainer	AN/PSS-14 (Mine detector)	Search	Electronic Warfare Officer (EWO)	Task Force Iron Claw Academy (TFICA)	Route clearance patrol	Patrol	Explosive hazard disposal	Cache search

Figure 1

Building the First EHTs. In the summer of 2008, the 8th Engineer Battalion, 36th Engineer Brigade, Fort Hood, Texas, was notified of an unprecedented deployment mission: The battalion headquarters would deploy to Iraq as an EHCC. The EHCC was a doctrinal engineer organization, but since none had been manned or established, the mission was assigned to an engineer battalion for execution. In addition to the EHCC mission, the battalion was directed to stand up four EHTs and would deploy the "bridging" form of both organizations to pave the way for actual EHCCs and EHTs in the future. As deployment neared, it became more and more obvious how different the bridge would be from the original concept.

The EHT was meant to embody the first true battlefield fusion of route clearance and EOD. However, it quickly became apparent that no EOD officers or technicians would be assigned to the teams. Instead, the EHTs were being built entirely of combat engineers from the battalion and maintained as excess personnel for the duration of the deployment. By the end of 2007, the battalion had a training plan in place and Soldiers slotted to fill four EHTs. The actual mission was still unknown, but the battalion pushed forward as deployment approached.

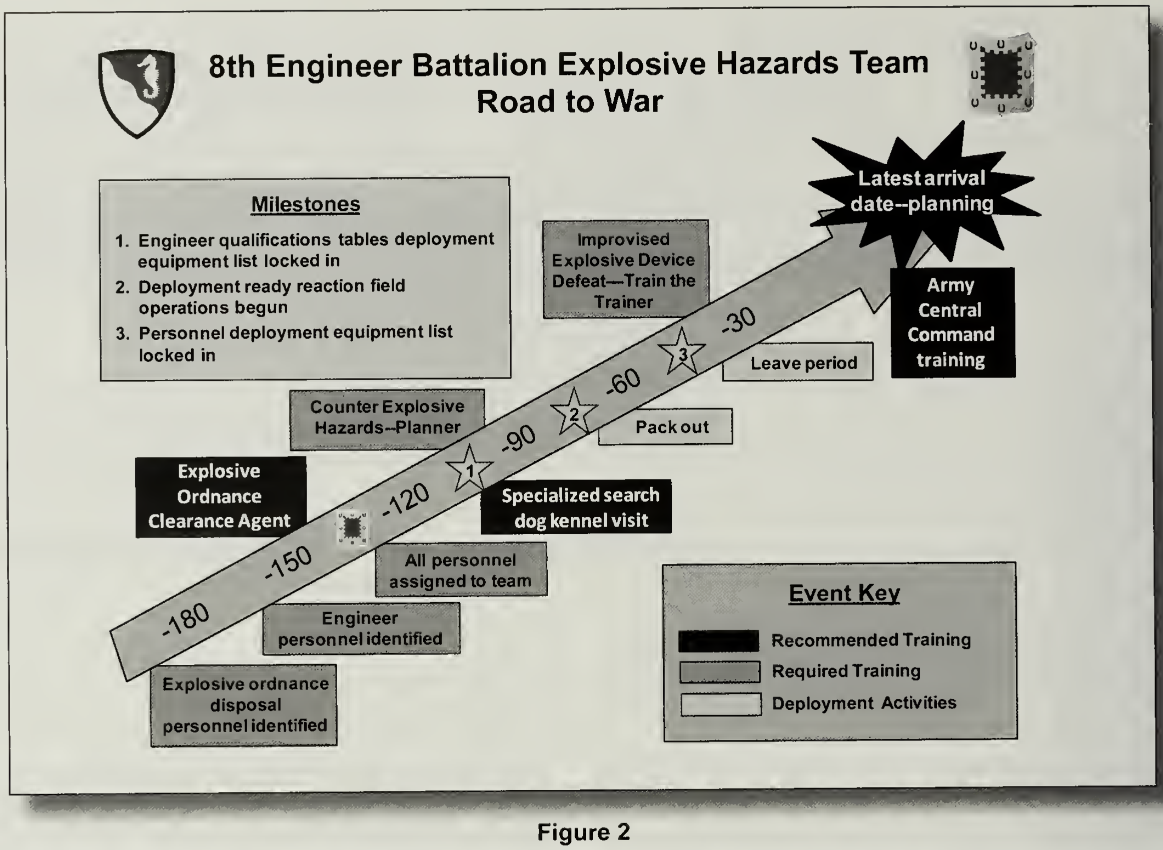
To support the new requirement of deploying specialized teams without EOD personnel, a comprehensive set of training and experience requirements was established for team members (see Figure 1). The closest an engineer can get to the unique skill set of an EOD technician is through the Explosive Ordnance Clearance Agent (EOCA) Course at the United States Army Engineer School at Fort Leonard Wood. This course is taught by Ordnance Branch instructors and improves the capability of route clearance engineers through exposure to EOD fundamentals, including—

- Munitions identification.
- Interrogation techniques.
- Limited explosive hazards disposal procedures.

Ideally, each team would have at least one EOCA-certified member. Other courses, such as Route Reconnaissance and Clearance Course–Sapper (R2C2–S), Counter Explosive Hazards–Planner, and IED Defeat–Train the Trainer (IEDD–T3) were also encouraged for team members.

In addition to home station training, theater-specific classes and previous combat experience were expected prerequisites to membership on a team. The 8th Engineer Battalion established the first EHT "Road to War" timeline (see Figure 2, page 20). Despite rigorous training and the previous experience of team members, EOD personnel were needed to close the capability gap. However, events on the battlefield conspired to keep them from joining the EHTs.

EOD in Play. In 2003, EOD fully supported the EHT concept, but things in Iraq had changed over the five years it took the Engineer Branch to man, equip, train, and employ the teams. Ever-increasing levels of insurgent and IED activity between 2003 and 2008 called for quick action on the ground. While the Engineer Branch worked through the process of updating doctrine in advance of force structure changes, the Ordnance Branch made more immediate theater-specific changes in lieu of a doctrinal solution. It increased the overall end strength of EOD personnel in-theater and embedded them with route clearance teams in high-threat areas. Though not the doctrinal solution envisioned by the Engineer Branch in the EHT, it was an answer to a theater-specific problem that was executed quickly with positive results. Engineers and EOD technicians were working together as equal components of a serious C-IED fight. In the view of the Ordnance Branch, the EHT was no longer relevant, so no EOD personnel would be provided to support the first EHTs.



8th Engineer Battalion Explosive Hazards Team Road to War

Milestones

1. Engineer qualifications tables deployment equipment list locked in
2. Deployment ready reaction field operations begun
3. Personnel deployment equipment list locked in

-180
-150
-120
-90
-60
-30
1
2
3
Explosive ordnance disposal personnel identified
Engineer personnel identified
All personnel assigned to team
Explosive Ordnance Clearance Agent
Counter Explosive Hazards--Planner
Specialized search dog kennel visit
Improvised Explosive Device Defeat—Train the Trainer
Pack out
Leave period
Army Central Command training
Latest arrival date--planning

Event Key

■ Recommended Training
▨ Required Training
☐ Deployment Activities

Figure 2

Theater Solutions for Engineers. The Ordnance Branch was not alone in developing theater-specific solutions. In 2007, the Engineer Branch implemented training that capitalized on courses such as EOCA and R2C2–S, focusing engineers on blow-in-place (BIP) procedures. BIP implementation varies, but the general concept has received fairly widespread acceptance. This engineer solution, when paired with Ordnance Branch solutions, gave more weight to the EOD assertion that the EHT was no longer relevant.

EHTs in Iraq Today

When the 8th Engineer Battalion arrived in-theater in June 2008 as four EHTs and an EHCC, members were immediately plucked from their teams to fill slots in the Multinational Corps–Iraq engineer staff (C-7) and Task Force Troy, a theater-specific unit charged with managing the C-IED fight (see Figure 3). Other EHT personnel were diverted to fill corps staff positions within the C-7 and future operations sections. A full EHT was placed in an oversight and instructor role for theater-specific R2C2–S training in Baghdad and Kuwait. None of the teams would be employed as an EHT for the next ten months.

Initial EHT Employment. By necessity, units and staffs must adapt to theater needs as the environment dictates. However, it is troublesome that the Engineer Branch would man, equip, train, and deploy units only to have them

Initial Explosive Hazards Team Personnel Employment in Iraq (June 2008)

(Doctrinal employment not fully realized)

Working for Combined Joint Task Force Troy (not employed by explosive hazards coordination cell)

- Provide trainers (subject matter experts) for:
  - Counter improvised explosive device level 1, 2, and 3
  - Intermediate search courses (ISE)
  - Intermediate threat area search (ITAS)
- Work with explosive ordnance disposal technicians to improve explosive hazard awareness courses
  - Input from Combined Joint Task Force Troy and Multinational Corps–Iraq engineer staff section explosive hazards coordination cell

Working for engineer staff section (explosive hazards team officers in charge)

- Infrastructure protection and reconstruction staff
- Future operations staff section
- Other (Route Reconnaissance and Clearance Course--Sapper, blow in place [Iraq and Kuwait])

Figure 3

sliced up for individual manning requirements. Being deployed as they were, without the key EOD capability, raises the question of whether EHTs were established to serve their doctrinal purpose in Iraq or if they were merely intended to fill a personnel requirement. However, by March 2009, it was possible to reestablish one of the teams (dubbed the 1st EHT Minotaurs) and prepare for a proof-of-concept mission. It acquired property such as weapons, robots, and a mine-resistant armor–protected (MRAP) vehicle; conducted refresher training on driving, crew drills, and Blue Force Tracker; and performed other troop-leading procedures to prepare for the mission. The team had to brush off ten months of cobwebs to gear up for the first real test of the skills they were deployed to use. There was much to do.

Before launching the proof of concept, intensive work by the battalion commander and staff was required to determine what this new team would actually do. The team was supposed to be a fusion of engineer and EOD capabilities, but the Engineer Branch had not provided any insight into what team employment should look like without EOD members. Now a team was about to execute an untried mission without an excess of guidance. Figure 4 represents the final 8th Engineer Battalion template for EHT functions. Without EOD specialists, the team's ability to execute these functions would be significantly degraded, but the proof of concept would move forward. It could determine the feasibility of employment without the requisite manning.

Explosive Hazards Team Functions

Tactical

- Provide route clearance team (RCT) explosive ordnance clearance agent/explosive ordnance disposal augmentation
- Execute limited site evaluation
- Execute limited explosive hazards disposal

Staff

- Provide updates to the joint operational area unexploded ordnance supplemental list (primary skill set inherent to explosive ordnance disposal personnel)
- Assist with explosive hazards analysis and targeting
- Liaise with operations and training section, intelligence section, counter improvised explosive device/improvised explosive device-defeat cell and explosive ordnance disposal at battalion/brigade level
- Provide explosive hazards product development assistance/expertise
- Provide updates to the explosive hazards database (Combined Information Data Network Exchange)

Training

- Provide explosive ordnance clearance agent-specific training on updates to the joint operational area unexploded ordnance supplemental list
- Execute military training teams in support of the latest explosive hazards tactics, techniques, and procedures and equipment fielding

Figure 4

Proof of Concept. In April 2009, the 1st EHT linked up with an engineer company that had been conducting clearance operations in-theater for nearly a year. As operators in a mature operational environment, Soldiers from this company would provide excellent feedback on how the EHT could augment the company in its clearance, C-IED, and counter explosive hazard fight. Equally important was whether this company saw any value in having an EHT at its disposal. This would depend on whether a small group of combat engineers would bring an additional skill set to the fight.

Doctrine Requires EOD Personnel

The EHT immediately began integrating with route clearance teams and embedding with them on missions. Senior EHT members engaged with the company tactical operations center to discuss capabilities, reporting procedures, and intelligence-gathering tech-niques. Every effort was made to find a niche and bring to the fight the special qualities that the Engineer Branch had envisioned in an engineer-only EHT. But soon it became apparent that the EHT did not have any skill sets or capabilities that were not already present in the company. A small number of extra combat engineers did not seem to offer any real benefit on the ground. Despite signs that led the EHT and its supported company to question EHT validity early on, the team pressed forward with the proof of concept. Substantial time and effort were expended in search of engineer-only EHT validity, but a concept can only be tried unsuccessfully in combat for so long before risk begins to outweigh an intangible benefit. The EHT was becoming nothing more than a distraction.

Members of the EHT and the engineer company agreed that the team, manned by combat engineers alone, brought nothing to the fight that a company of combat engineers didn't already provide. However, all parties agreed that the original vision of fusing engineer and EOD capabilities would break ground in battlefield capability. The question on everyone's mind was why the team was being employed without EOD members. The proof of concept clearly demonstrated the inadequacy of an EHT without them. Although it was short-lived, the first EHT mission served the crucial purpose of invalidating the assumption that an all-engineer EHT had a place on the battlefield. Members of all four EHTs continue to serve throughout the Iraq theater of operations in engineer capacities outside the scope of their original deployment orders.

Perhaps the most distressing aspect of the all-engineer team's shortcomings is not what is happening in Iraq right now but what is happening in garrisons across the United States. EHTs are now in different stages of being stood up as numbered units that will soon deploy to replace the current EHTs. The teams are asking what their task, purpose, mission, and mission-essential task lists (METLs) are. Manned by combat engineers alone, without the doctrinal inclusion of EOD personnel, the answers are decidedly unknown.

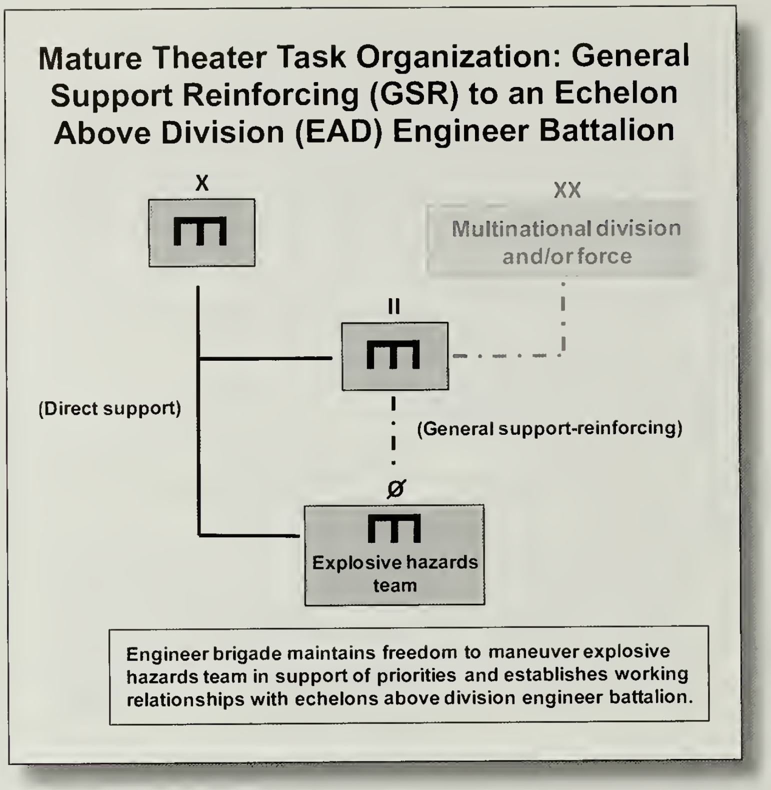

Mature Theater Task Organization: General Support Reinforcing (GSR) to an Echelon Above Division (EAD) Engineer Battalion
X
XX
Multinational division and/or force
II
(Direct support)
(General support-reinforcing)
ø
Explosive hazards team
Engineer brigade maintains freedom to maneuver explosive hazards team in support of priorities and establishes working relationships with echelons above division engineer battalion.

Figure 5

Recommendations

Manning. EHTs must train and deploy with EOD personnel, according to doctrine. The EHT, as a fusion of EOD and engineer effort and capabilities on the battlefield, requires the personnel authorized by its modified table of organization and equipment (MTOE) in order to execute its doctrinal mission. Without adherence to this principle, the EHT will continue to be ineffective, lending itself to misuse in filling manpower gaps.

Task Organization. The EHT is designed to task-organize in "support of brigades, brigade combat teams, and joint interagency multinational brigade-size units and smaller." This makes great sense for an expeditionary team supporting contingency operations in an immature theater. The immature theater is where the EHT functions of explosive hazards site analysis and explosive hazards database updating play a significant and necessary role. Through liaison with a theater EHCC, acting as primary database manager, the EHT acts as the eyes and ears in cataloguing ASPs; major caches; explosive hazards trends; and subsequent clearance, reduction, and mitigating TTP. Ultimately, the EHT can act in a management capacity, providing oversight to contract reduction of ASPs and minefields.

Task organization for employment along these lines fits the MTOE-dictated relationships above—organized in support of brigade-size headquarters, with established liaison to a theater EHCC. However, the constructive use of EHTs in a mature theater requires a different command support relationship.

The need in Iraq today for ASP, minefield, cache, and explosive hazards trend cataloguing to be executed by a new entity is negligible. Theater-specific systems are in place, and coalition involvement in munitions clearance operations is drawing down. Consequently, the EHT is now free to function in a more direct support capacity in the C-IED fight at battalion level and below. Figure 5 represents the most advantageous organization of EHTs while maintaining freedom of maneuver through the theater engineer brigade, which must leverage EHTs in relationship to threat and the explosive hazards environment on the ground. Done effectively, this will provide an engineer battalion commander with additional capability in prosecuting the C-IED/explosive hazards fight within his operational environment.

Doctrine. Current doctrine establishes the bare essentials in clarifying things such as the EHT's task, purpose, mission, and METL. It is far from perfect, and at times is confusing. The good thing is that there is a baseline established. The next step is to refine and improve on the current doctrine to fill in all the gaps. Units are wrestling right now to establish the next EHTs. Refined and improved doctrine, even if initiated now, will not be published in time for those teams to use it during train-up, but they won't be the last teams that wrestle with identity, task, and purpose. Current doctrinal shortfalls need to be addressed in support of future EHTs and their understanding of integration with the explosive hazards fight.

The Way Ahead

Somewhere between 2003 and April 2009, a valid doctrinal concept lost its momentum, bogged down by branch infighting and a lack of institutional knowledge. Reduced to nothing more than an engineer personnel resource pool in Iraq, the EHT is at risk of becoming obsolete before being truly exercised as intended. But those involved in establishing the first EHT and the subsequent proof of concept agree that, manned properly, there could be a real and significant future for the EHT. In fact, there may be no better time than right now to get back to basics, align engineer doctrine with action in-theater, reengage with the Ordnance Branch, and truly prove the concept called "explosive hazards team." The next step will require engineer leader involvement and engagement, but as a small piece of the future of our branch, that shouldn't be too much to ask.

Captain MacDonald is the officer in charge of the 1st Explosive Hazards Team, 8th Engineer Battalion, 36th Engineer Brigade. Previous assignments include Commander, 584th Engineer Company (Mobility Augmentation Company), 8th Engineer Battalion; and Commander, Alpha Company, 16th Engineer Battalion. He has been selected for the Army Congressional Fellowship Program and will be concurrently pursuing a master's in legislative affairs at George Washington University.

Developing and Executing a Home-Station Battalion Mission Rehearsal Exercise

By Captain William H. Shoemate II

As the United States Army struggles with the intricate management of the Army Force Generation process, transformation, and the continual feed of forces to support the War on Terrorism, engineer formations have been left off the mission rehearsal exercise (MRE) training cycle. This has become a recurring problem for the engineer force. Engineer commanders have no choice but to solicit brigade combat teams (BCTs) to be inserted into their combat training center (CTC) MRE rotation before a deployment for Operation Iraqi Freedom or Operation Enduring Freedom. This might work, but engineer commanders usually are at the mercy of competing resources, such as money, shortfalls in observer-controller (OC) manpower, and the CTCs' BCT-centric training menu.

This article illustrates the recent successes of a combat effects engineer battalion MRE replication on the island of Oahu, Hawaii. The 130th Engineer Brigade had to develop a home-station MRE for the 65th Engineer Battalion (Combat Effects) because it couldn't schedule a timely CTC rotation to meet the battalion's deployment training requirements. Besides training and validating the 65th, the biggest deliverable for this MRE was the proof that an Operation Iraqi Freedom training venue can be developed outside the CTC platform. However, it requires tremendous external support, ingenuity, and teamwork.

If the Army invested efforts into designing, equipping, and manning an exportable training capability for modular forces outside the BCT formation, commanders would have the value-added opportunities to insert combat enablers to CTC rotations and/or dedicated home-station MRE resources. Of course, the next problem would be creating a capability that can meet throughput requirements. By designing an exportable training capability, the Army would get the needed insurance that all forces are receiving the same level of training before an Operation Iraqi Freedom or Operation Enduring Freedom rotation. The question remains, "Who within the United States Army Training and Doctrine Command (TRADOC) executes this exportable training capability—the CTCs or the United States Army Maneuver Support Center (MANSCEN) at Fort Leonard Wood, Missouri?"

For the 130th Engineer Brigade, a synergistic team effort from the brigade staff; the United States Army Garrison, Hawaii, at Schofield Barracks; the Joint Center of Excellence (JCOE) for Improvised Explosive Device (IED) Defeat, Fort Irwin, California; and the Counter-IED (C-IED) Mobile Assistance Training Team (CMATT) No. 1, Fort Bragg, North Carolina, proved that a joint-level MRE-type platform can be designed and linked to meet today's modular engineer force training requirements. Garrisons already have the virtual means via the CTCs; the Directorate of Plans, Training, and Mobilization can provide a forward operating base footprint; and the Training and Audiovisual Support Center would have to stock essential Operation Iraqi Freedom-centric training resources. The JCOE and CMATT already have the manpower and funding. However, several questions arise:

- *Is contract training the intermediate or long-term fix?*
- *How do contractors sustain relevancy without deployment to the area of operations?*
- *Is the CTC or MANSCEN the link that fuses the JCOE, CMATT, and the garrisons to design and deliver this exportable training capability?*

It would not be feasible or cost-effective to replicate the entire CTC training scenario for a home-station MRE, but engineer commanders can tailor CTC training menus to meet essential training shortfalls within a home-station-driven MRE scenario. As the operational tempo continues to escalate for engineers, and dirt CTCs continue to be a scarce resource for engineer formations, an exportable training capability that encompasses TRADOC (CTC and MANSCEN), United States Army Forces Command, and the Installation Management Command is the right course of action. Who will take the lead?

—Colonel Fabian Mendoza Jr.
Commander, 130th Engineer Brigade

Despite today's high operational tempo and frequent separate engineer battalion deployments, the Army still hasn't fully answered the question concerning conducting an MRE and validating the preparedness of a separate engineer battalion. BCTs receive dirt CTC rotations and engineer brigades get Battle Command Training Program (BCTP) rotations. However, the CTCs are not manned to train separate engineer battalions, so getting a CTC rotation for an engineer battalion remains a hit-or-miss affair. The 130th Engineer Brigade, newly stood up in Hawaii, was faced with the challenge of preparing and validating the 65th Engineer Battalion for an Operation Iraqi Freedom deployment without the benefit of a CTC rotation. This article illustrates how the 130th and the 65th tackled this problem by planning and executing a home-station battalion MRE that consisted of individual skill training, convoy live fire, a simulation-driven staff exercise (STAFFEX), and multiechelon training at the company and platoon levels.

Concept Development

Once the brigade confirmed that it could not secure a CTC rotation for the 65th Engineer Battalion, it coordinated with the Joint IED Defeat Organization's (JIEDDO's) JCOE for assistance. The C-IED training experts from the center helped the 65th Engineer Battalion MRE by—

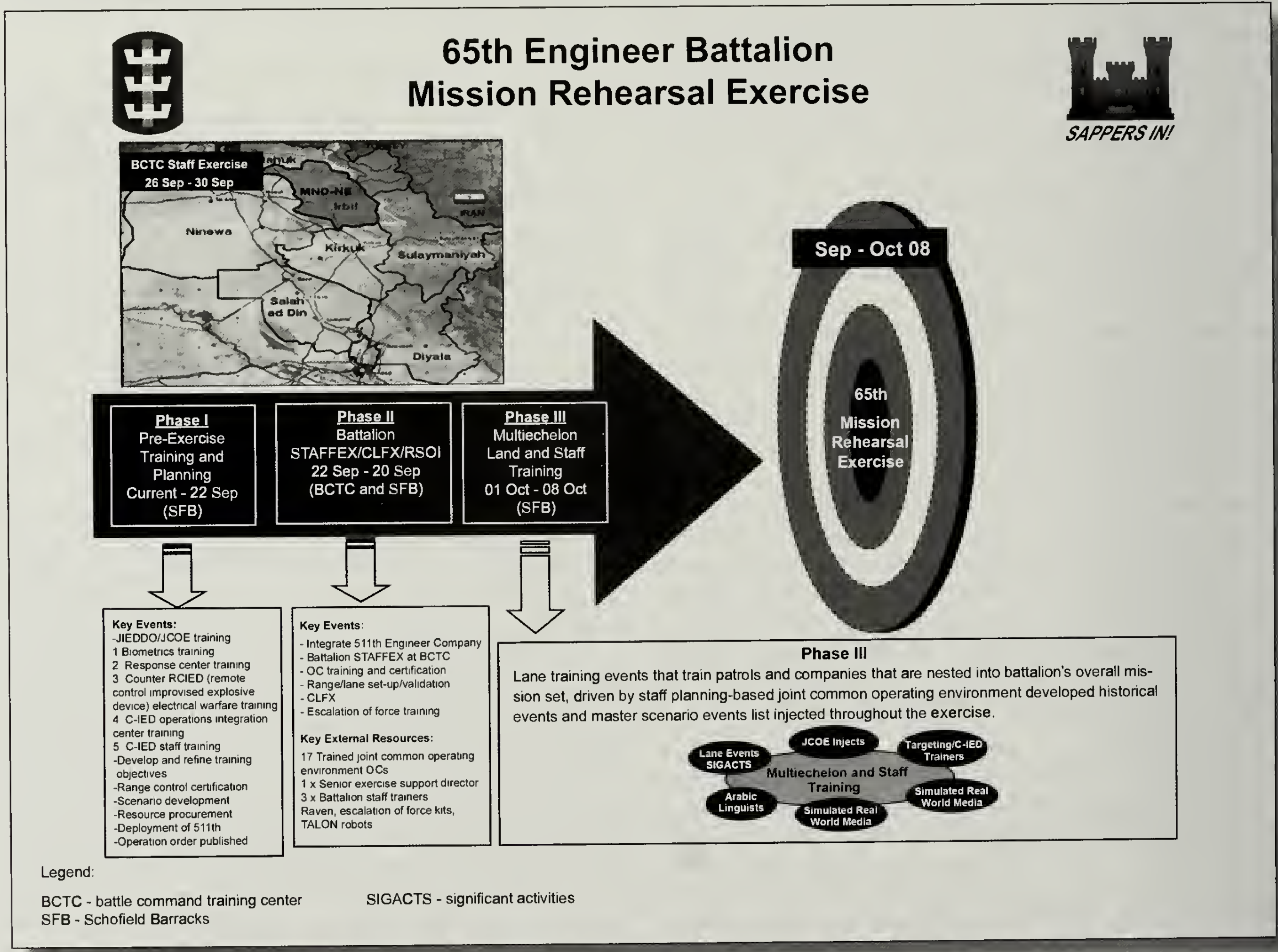
- Developing IED lanes.
- Providing realistic training devices.
- Assisting with C-IED battle staff training.
- Helping develop a realistic and complex intelligence history to challenge the staff in pattern analysis.
- Providing "train the trainer" instruction on United States Army Central Command Southwest Asia C-IED tasks.

JCOE in turn tasked a CMATT from Fort Bragg to assist the brigade. Along with the battalion, the brigade and the CMATT then conducted a series of in-process reviews (IPRs) to refine and develop the structure of the MRE (see Figure 1).

During the initial IPR, the battalion identified its primary training objectives for the MRE—training the staff and teaching basic patrol and route clearance operations. The brigade then identified the training methodology and resources such as land, ammunition, trainers, OCs, vehicles, and training aids to meet the training objectives. Although the Schofield Barracks range complex is small, it has several ideal locations for specific training, which aided in the development of situational training exercise (STX) lanes. Tied to the battalion training objectives, the brigade developed five STX lanes to train the myriad of tasks that the battalion's Soldiers would face in-theater. The lanes included—

- Two route clearance lanes.
- One dismounted patrol lane.
- One mounted patrol lane.
- One entry control lane.

Developing a training plan for the companies and patrols was not enough. The brigade developed a plan to stress and train the battalion staff through a combination of virtual



65th Engineer Battalion
Mission Rehearsal Exercise

Phase I
Pre-Exercise Training and Planning
Current - 22 Sep
(SFB)

Phase II
Battalion STAFFEX/CLFX/RSOI
22 Sep - 20 Sep
(BCTC and SFB)

Phase III
Multiechelon Land and Staff Training
01 Oct - 08 Oct
(SFB)

Key Events:
-JIEDDO/JCOE training
1 Biometrics training
2 Response center training
3 Counter RCIED (remote control improvised explosive device) electrical warfare training
4 C-IED operations integration center training
5 C-IED staff training
-Develop and refine training objectives
-Range control certification
-Scenario development
-Resource procurement
-Deployment of 511th
-Operation order published

Key Events:
- Integrate 511th Engineer Company
- Battalion STAFFEX at BCTC
- OC training and certification
- Range/lane set-up/validation
- CLFX
- Escalation of force training

Key External Resources:
17 Trained joint common operating environment OCs
1 x Senior exercise support director
3 x Battalion staff trainers
Raven, escalation of force kits, TALON robots

Phase III
Lane training events that train patrols and companies that are nested into battalion's overall mission set, driven by staff planning-based joint common operating environment developed historical events and master scenario events list injected throughout the exercise.

Lane Events SIGACTS
JCOE Injects
Targeting/C-IED Trainers
Multiechelon and Staff Training
Arabic Linguists
Simulated Real World Media
Simulated Real World Media

Legend:
BCTC - battle command training center
SFB - Schofield Barracks
SIGACTS - significant activities

Figure 1

and real-world inputs. The brigade seized the opportunity to use the local Battle Command Training Center (BCTC) for a simulation-driven STAFFEX. To provide a foundation for staff analysis, JCOE trainers worked with brigade and BCTC planners to develop the scenario and range of historically significant activities relevant to the battalion's future area of operations. The brigade also made the STX training multiechelon by overlaying graphics of the terrain the unit would occupy in Iraq with the local terrain, incorporating a prebrief/debrief process, and by having the battalion account for significant activities occurring on the lanes as well as those in the simulation.

Once the major collective events for the MRE were developed, the planners—working with CMATT—cross-walked the individual tasks necessary to support the collective training events and determined what special training skills were needed to execute the collective tasks. They developed an individual training plan that supported the collective training events. Figure 2 lists the individual and special equipment training provided by the JCOE and CMATT.

One of the serious shortcomings in home-station training for Operation Iraqi Freedom and Operation Enduring Freedom is the significant limitation of theater-provided training resources. These limitations can create a drastic difference in training execution versus theater reality. CTCs have this equipment, but other posts often do not. The JCOE provided much of the required equipment and helped contract Arabic linguists for the training. The brigade coordinated with the 25th Infantry Division Aviation Brigade to tie real-world air medical evacuations to the STX lanes.

Training Phases

The output of the initial IPR was a memorandum of understanding between the 130th Engineer Brigade, JCOE, and CMATT that laid out all areas of training and resourcing responsibility. The framework included three phases:

Phase I

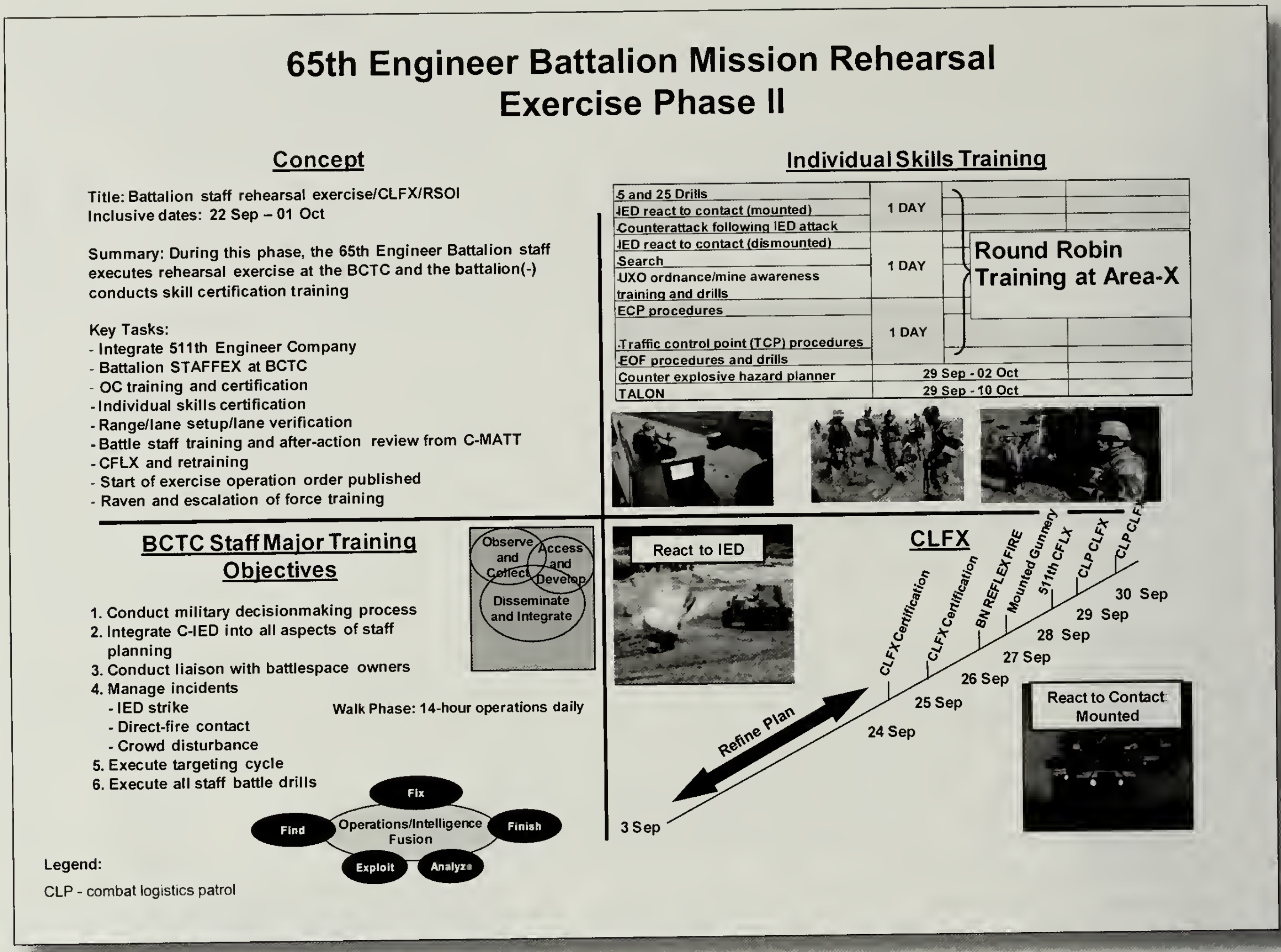
Preexercise planning for individual and specialty skill training. This phase prepared the battalion for STX lane execution by training and validating individual skills necessary for subsequent collective training. CMATTs occupied the brigade area of operations and instructed the classes listed in Figure 2. Mobile training teams provided a two-day OC academy focused on C-IED tactics, techniques, and procedures (TTP); patrol and route clearance operations; and after-action reviews. The brigade planner used this time to develop the battalion STAFFEX with current and relevant theater-specific data. To do this, the brigade planner, JCOE trainers, and BCTC staff conducted numerous IPRs to collect and analyze data from theater in the 65th Engineer Battalion's future area of operations. Planners pulled data daily from the battalion's future higher headquarters to develop a minimum equipment serviceability list (MESL). MESL formation continued throughout this phase and culminated with an operational overview to the battalion staff to kick off the STAFFEX. This operational overview provided the battalion staff a 90-day historical look into their operation, allowing a smooth occupation of the BCTC.

Joint Center of Excellence/ Counter-IED Mobile Assistance Training Team Topics

- Electronic warfare officer (EWO) training
- Battalion EWO training
- Specialized C-IED working group
- EWO company specialist training
- IED awareness train the trainer
- Command intelligence support team training
- Homemade explosive training
- Crystal software training
- Intelligence, surveillance, and reconnaissance (ISR) overview
- Biometrics Automated Toolset training
- Route clearance training
- Handheld Interagency Identity Detection Equipment training
- Counter RCIED electronic warfare (CREW)/ CREW operator
- C-IED operations center
- Raven training
- C-IED operations integration center
- C-IED principles
- Soldier as sensor
- Unexploded ordnance (UXO) awareness
- Escalation of force kit and TTP
- React to contact (IED), mounted and dismounted
- IED search
- Entry control point (ECP) procedures

Figure 2

In conjunction with the STAFFEX planning and OC training, the brigade established and trained its white cell to run the convoy live-fire exercise. This training certification was laid out over two days and supervised by a brigade staff officer. The brigade white cell (a nondeploying company used to provide opposing forces and civilians on the battlefield) would eventually transition into the trainers for the 65th Engineer Battalion (-) convoy live-fire exercise (CLFX) execution during Phase II. The white cell's duty was to provide problems the battalion had to solve.



65th Engineer Battalion Mission Rehearsal Exercise Phase II

Concept

Title: Battalion staff rehearsal exercise/CLFX/RSOI
Inclusive dates: 22 Sep – 01 Oct

Summary: During this phase, the 65th Engineer Battalion staff executes rehearsal exercise at the BCTC and the battalion(-) conducts skill certification training

Key Tasks:
- Integrate 511th Engineer Company
- Battalion STAFFEX at BCTC
- OC training and certification
- Individual skills certification
- Range/lane setup/lane verification
- Battle staff training and after-action review from C-MATT
- CFLX and retraining
- Start of exercise operation order published
- Raven and escalation of force training

Individual Skills Training

5 and 25 Drills IED react to contact (mounted) Counterattack following IED attack	1 DAY	Round Robin Training at Area-X
IED react to contact (dismounted) Search UXO ordnance/mine awareness training and drills	1 DAY	
ECP procedures Traffic control point (TCP) procedures EOF procedures and drills	1 DAY	
Counter explosive hazard planner	29 Sep - 02 Oct	
TALON	29 Sep - 10 Oct	

BCTC Staff Major Training Objectives

1. Conduct military decisionmaking process
2. Integrate C-IED into all aspects of staff planning
3. Conduct liaison with battlespace owners
4. Manage incidents
   - IED strike
   - Direct-fire contact
   - Crowd disturbance
5. Execute targeting cycle
6. Execute all staff battle drills

Walk Phase: 14-hour operations daily

Legend:
CLP - combat logistics patrol

Figure 3

Phase II

Reception, staging, onward movement, and integration (RSOI)/battalion STAFFEX/CLFX. As this phase began, the 65th Engineer Battalion staff occupied the BCTC with the same tactical operations center configuration and Army Battle Command Systems they will use in-theater and began executing their battle rhythm according to their standing operating procedures. The battalion received MESL injects that exercised its tactical operations center battle drills, focusing on identified training objectives. The 130th Engineer Brigade played the role of high command for the exercise, replicating the in-theater higher headquarters brigade and its battle rhythm. The brigade staff MESL development drove the battalion staff working group inputs and outputs. The C-IED working group output would lead to the development of the patrol schedule that drove the link for the training on the ground and the continuation of the STAFFEX into Phase III. The brigade staff provided OCs and was supported by staff trainers from the JCOE. The OC team, led by the brigade executive officer, conducted nightly debriefs to the brigade commander, identifying focus areas and shifting priorities for the MRE.

Also during this phase—and key to the success of the entire training event—was the deployment of a mainland engineer company to Schofield Barracks. The 511th Engineer Company will be a subordinate company to the battalion in-theater. It also received no CTC rotation. By pulling in the 511th, the exercise gave the company and battalion leadership the opportunity to build teams for deployment.

Finally, the white cell used this phase to run convoy live-fire for the battalion, after which the white cell transitioned to setting up the STX lanes with the assistance of the CMATT trainers. Figure 3 lays out the key training objectives within Phase II and the execution of convoy live fire.

Phase III

STX/multiechelon training—virtual and real-world. This phase was a complex operation that combined both live STX training and virtual training within the BCTC, continuing the training battle rhythm started during Phase II. The key to executing this phase successfully was ensuring the synchronization between the BCTC-driven simulation and patrols. To train the staff and incorporate the patrols on the ground, Schofield Barracks terrain was transformed to replicate the battalion's future area of operations. Each lane was depicted as a separate area, with a maneuver landowner through whom the patrol leader would coordinate movement and report significant activities, which would then flow to the BCTC, where the exercise control cell would transpose them to a grid coordinate on the Multinational Division–North overlay. When done successfully, the battalion staff received five to eight SIGACTS from their live patrols in addition to the simulation-driven ones in adjacent unit areas. These SIGACTS would mesh with the others generated within the simulation, thus providing data for the battalion to exercise its working groups and staff processes.

The five STX lanes allowed training on all the key tasks that patrols might encounter in-theater. The two route clearance lanes exercised basic TTP against the many IED threats the patrols will face. They also trained reaction to vehicle-borne IEDs. The mounted patrol lane allowed units without a route clearance mission to conduct patrols and react to various forms of contact. The dismounted patrol lane trained Soldiers to operate dismounted in an urban environment, negotiate, use interpreters, and react to various forms of contact while dismounted. Finally, the ECP lane trained Soldiers on interaction with local nationals and the fundamentals of escalation of force. All lanes included medical evacuation training. The brigade white cell provided opposing forces and civilians on the battlefield. The successful lane training was the result of combined brigade headquarters and CMATT trainer OC efforts.

Conclusion

The 130th Engineer Brigade sponsored and operated a successful MRE that trained and validated the 65th Engineer Battalion. However, it would not have been possible without getting unconventional training support and sacrificing the brigade staff for two weeks to act as OCs. Understanding the scope of available outside resources is essential to developing a training concept. The JCOE and the CMATT provided resources and training that the battalion otherwise would not have received before deploying and turned a middle-of-the-road training event into a first-class home station MRE. Until the Department of the Army determines a method to allow CTC rotations for all engineer battalions or develops an exportable training package, engineer brigades will be forced to use similar methods to ensure that their Soldiers are prepared for deployment.

Captain Shoemate is the assistant operations and training officer (S-3) for the 130th Engineer Brigade. Previous assignments include S-3 and senior engineer battalion advisor, Support Battalion, 196th Infantry Brigade; Commander, Headquarters, Headquarters Detachment, Asymmetric Warfare Group; group engineer officer and S-3, Asymmetric Warfare Group; and Commander, Headquarters Company, 2d Infantry Division. He holds a bachelor's in social sciences from the University of the Ozarks and graduated from the Engineer Captains Career Course and the Combined Arms and Services Staff School.

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The Maneuver Enhancement Brigade

By Colonel Charles A. Williams and Mr. Joe Crider

> *"The Army is in the midst of a transformation process to move it to modularity—by adopting the six warfighting functions and creating new and special organizations. One of those new and special organizations is the MEB [maneuver enhancement brigade] . . . designed as a C2 [command and control] headquarters with a robust multifunctional brigade staff that is optimized to conduct [maneuver support] operations. Maneuver support operations integrate the complementary and reinforcing capabilities of key protection, movement and maneuver, and sustainment functions, tasks, and systems to enhance freedom of action."*[1]
>
> *—Field Manual (FM) 3-90.31, Maneuver Enhancement Brigade Operations*

The intent of this article is to provide a basic understanding of the capabilities and doctrine of the maneuver enhancement brigade (MEB) and its role in the modular Army. It offers a basic description of the MEB's unique capabilities, relevance to the current force,[2] and importance to the United States Army Maneuver Support Center (MANSCEN).

The evolution of the MEB traces its roots to the Army's transformation initiatives, which identified modularity as one of its primary goals. The Army's goal in developing modular units was to serve the specific needs of combatant commanders by providing tailored forces[3] to support full spectrum operations. The Army's leaders envisioned modularity as a bridge linking current capability requirements with those anticipated for the future. This strategy culminated in the Army's decision to limit its brigade force structure to the following five distinct types:

- Infantry brigade combat teams (IBCTs)
- Heavy brigade combat teams (HBCTs)
- Stryker brigade combat teams (SBCTs)
- Functional brigades
- Multifunctional brigades

As one of five multifunctional brigades, the MEB is the only one designed to manage terrain, a capability it shares with the brigade combat teams (BCTs).

With no antecedents, the MEB represents a unique, and at times somewhat misunderstood, organization. It is a dynamic and multifunctional organization, predicated entirely on tailored forces task-organized for a specific objective. In many ways, it is an organization like no other, offering a tremendous variety of functional and technical depth coupled with significant lethality. The MEB delivers critical complementary and reinforcing capabilities in a flexible and scalable manner that is essential to conducting full spectrum operations. Included in these capabilities is the capacity to deliver any combination of lethal and nonlethal effects.

The MEB's critical missions or key tasks include maneuver support operations, consequence management operations, stability operations, and support area operations. A common thread among each of these missions is the obvious capability requirements of MANSCEN's three proponents—chemical, engineer, and military police.

What the MEB Is

- The MEB is designed as a unique multifunctional command and control (C2) headquarters to perform maneuver support, consequence management, stability operations, and support area operations for the supported force, normally the division.
- The MEB is a bridge across the capability gap between the more capable functional brigades and the limited functional units, such as chemical, biological, radiological, and nuclear (CBRN); engineer; and military police of the BCTs. This headquarters provides greater functional staff capability than BCTs, but usually with less than a functional brigade. The key difference between the MEB and the functional brigades is the breadth and depth of the MEB's multifunctional staff. The MEB provides complementary and reinforcing capabilities. The MEB staff bridges the planning capabilities between a BCT and the functional brigades.
- The MEB is an "economy-of-force" provider that allows BCTs and maneuver units to focus on combat operations. It directly supports and synchronizes operations across all six Army warfighting functions. For example, economy-of-force missions might involve support to counterinsurgency or other "terrain owner" missions. The MEB serves a vital economy-of-force role by freeing the BCT to concentrate on its priorities, when adequately sourced with maneuver formations and other capabilities, such as intelligence, surveillance, and reconnaissance (ISR); fires; information operations; and medical operations.
- The MEB is similar to a BCT, without the BCT's maneuver capability, providing C2 for an assigned area of operations, unlike other support or functional brigades. Unique staff cells such as area operations, fires, air space, and liaison officer (LNO) assets give the MEB a level of expertise in area of responsibility and terrain management uncommon in a functional brigade.
- The MEB is capable of supporting divisions and echelon-above-division (EAD) organizations as well.

- The MEB is able to conduct combat operations up to the level of a maneuver battalion when task-organized with a tactical combat force (TCF) or other maneuver forces.

What the MEB Is Not

- The MEB is not a maneuver brigade but is normally assigned an area of operation (AO) and given control of terrain. The MEB's only maneuver is defensive, with very limited offensive maneuver when it employs its reserve (response force or TCF) to counter or spoil threat. When the situation requires, the MEB executes limited offensive and defensive operations, using response forces or TCF against Level II or III threats.
- The MEB is not mainly composed of organic assets, but rather a tailored set of units.
- The MEB is not typically as maneuverable as a brigade. Instead, it is designed to be assigned an AO and C2 with higher headquarters-assigned tactical control for security of tenant units.
- The MEB is not designed to conduct screen, guard, and cover operations, which are usually assigned to BCTs.
- The MEB is not a replacement for the functional brigades, especially at EAD.
- The MEB is not a replacement for functional brigades for missions such as counter chemical, biological, radiological, nuclear, and high-yield explosive (CBRNE) weapons and threats across the entire operational area; major complex CBRNE or WMD-elimination operations; major focused combat and/or general engineering operations; brigade-level internment/resettlement operations; major integrated military police operations (each involving three or more battalions); or missions requiring increased functional capabilities and staff support or exceeding the C2 focus of the MEB.
- The MEB is not replaceable by a CBRN, engineer, or military police brigade to perform other functional missions within its own AO or at other selected locations within the division AO.
- The MEB is not a replacement for unit self-defense responsibilities.

MEB Headquarters

Of particular significance to MANSCEN proponents and stakeholders is the MEB's robust headquarters design. Currently numbering nearly 200 Soldiers, noncommissioned officers, warrant officers, and commissioned officers, the MEB headquarters is among the largest in the Army's brigade inventory. The majority of these coded authorizations specifically require chemical, engineer, and military police personnel. To further extend its utility, force developers included authorizations for several other functions—such as fire support coordination and air space management—that lend the MEB unique planning and execution capabilities necessary to support its own AO. The robust planning and C2 capabilities organic to the MEB headquarters serve as its primary attributes, making it ideal for complex missions requiring a flexible response and scalable effects along the spectrum of conflict. For example, the MEB may conduct missions ranging from support such as police or civil engineering to a host nation to support to a division conducting a deliberate river crossing. The relevance and potential of the MEB continues to evolve, particularly in the realm of support to civil operations, as evidenced recently in the requirement for the MEB to provide support to a CBRNE consequence management response force (CCMRF).

Organization

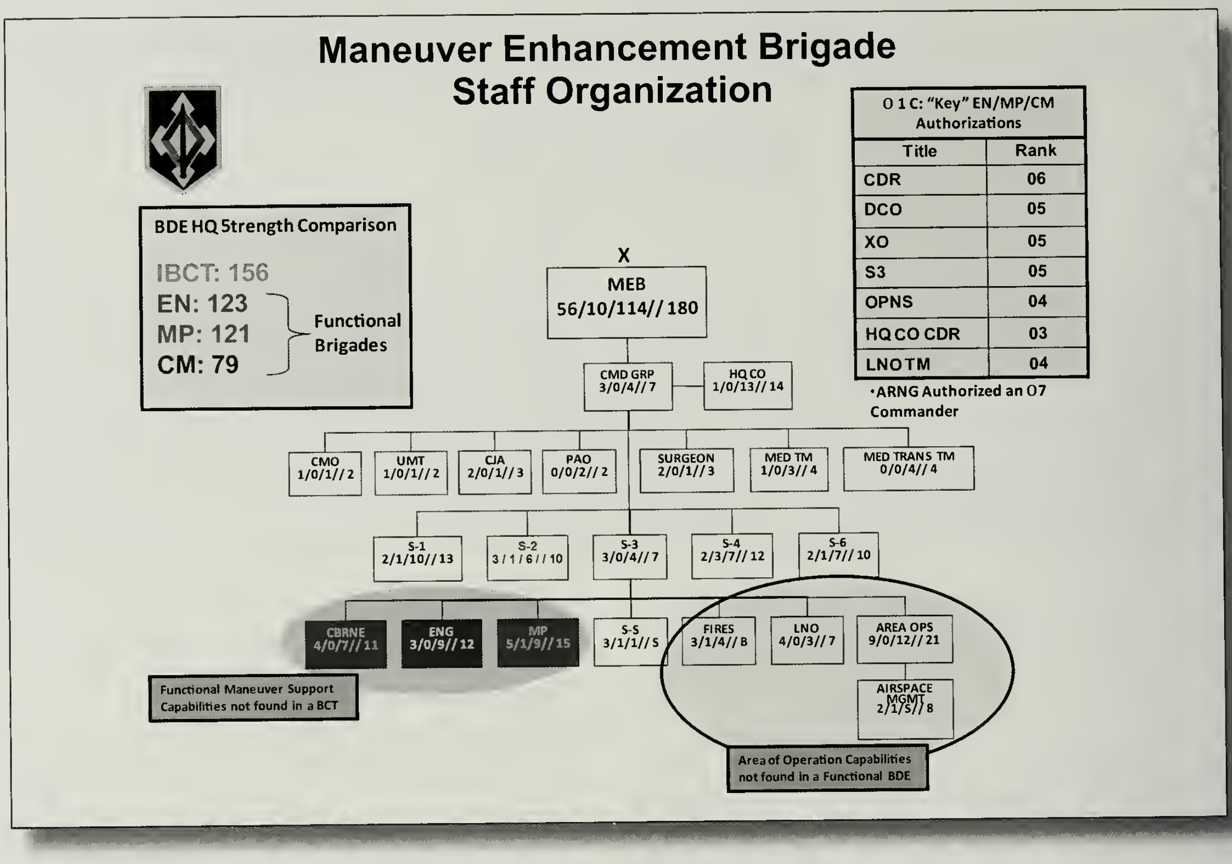
The MEB's central purpose is to provide tailored support to the modular division and corps (supported force) in order to meet wide-ranging requirements in support of full spectrum operations. To support this need, the MEB maintains a robust headquarters design composed of multiple coordinating and special staff cells. Included in the headquarters is a broad range of functional expertise that enables the commander to optimize his capabilities and tailor his response (see figure on page 28).

These cells provide the MEB with unique capabilities such as the following:

- *Fires Cell.* Provides indirect fire coordination (tube, rocket, rotary-wing, or close air support [CAS]); enables the commander to extend protection throughout the support AO; enables mitigation of a host of threats, including support to a TCF (when assigned) in mitigating a Level III threat.
- *LNO Cell.* With permanently assigned LNO personnel, coordinates and establishes liaison vertically with senior and subordinate commands and horizontally with joint, interagency, intergovernmental, and multinational (JIIM) or other agencies located in its AO.
- *Area Operations Cell.* Provides the commander with added flexibility on planning and coordinating activities related to terrain management, while not distracting the operations and training cell or civil affairs cell from its primary focus.
- *Airspace Management Cell.* Coordinates air operations during support area operations or when the MEB is assigned an AO.

The "01C Initiative" is an approved special reporting code that designates seven key positions—commander, deputy brigade commander, executive officer, training officer, operations officer, headquarters company commander, and LNO team chief—within the MEB to be filled by chemical, engineer, or military police officers. The rationale for this initiative extends from the understanding that the majority of the MEB's capabilities involve maneuver support. Limiting these billets to chemical, engineer, and military police officers is a way to assure technical and functional expertise within the seven most critical command and senior staff positions (see figure on page 10).

Beyond the headquarters nucleus, the MEB is a task-organized unit tailored to meet a specific mission requirement. To ensure flexibility, the designers of the MEB structure limited its organic composition to a headquarters, a headquarters company, a network support company, and a brigade support battalion. Though mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT–TC)-dependent, a typical MEB task organization would likely include chemical, engineer, military police, and explosive ordnance disposal (EOD) assets. Also based on METT–TC, it could include air defense artillery, civil affairs, and a TCF.[4]



Maneuver Enhancement Brigade Staff Organization

BDE HQ Strength Comparison

IBCT: 156
EN: 123
MP: 121
CM: 79
Functional Brigades

O 1 C: "Key" EN/MP/CM Authorizations	
Title	Rank
CDR	06
DCO	05
XO	05
S3	05
OPNS	04
HQ CO CDR	03
LNO TM	04

•ARNG Authorized an O7 Commander

Functional Maneuver Support Capabilities not found in a BCT

Area of Operation Capabilities not found in a Functional BDE

Doctrine

The major tenets of FM 3-90.31 include the following:

- *Maneuver Support Operations.* These operations integrate the complementary and reinforcing capabilities of key protection, movement and maneuver, and sustainment functions, tasks, and systems to enhance freedom of action. For example, these key tasks may include area security, mobility, and internment and resettlement operations. Maneuver support operations occur throughout the operations process of planning, preparing, executing, and assessing. The MEB conducts maneuver support operations and integrates and synchronizes them across all the Army warfighting functions in support of offensive and defensive operations and in the conduct or support of stability operations or civil support operations.[5]

- *Combined Arms Operations.* The MEB is a combined arms organization that is task-organized based on mission requirements. The MEB is primarily designed to support divisions in conducting full spectrum operations. It can also support operations at EAD, including corps, theater, Army, joint, and multinational C2 structures. Still further, it is ideally suited to respond to state and federal agencies in conducting civil support operations in the continental United States. The MEB has limited offensive and defensive capabilities in leveraging its TCF (when assigned) to mitigate threats within its AO.[6]

- *Support Area Operations.* The MEB conducts support operations within the echelon support area to assist the supported headquarters to retain freedom of action within the areas not assigned to maneuver units. When conducting support area operations, the MEB is in the defense, regardless of the form of maneuver or the major operation of the higher echelon. Support area operations include the need to—
  - ▶ Prevent or minimize interference with C2 and support operations.
  - ▶ Provide unimpeded movement of friendly forces.
  - ▶ Provide protection.
  - ▶ Conduct operations to find, fix, and destroy enemy forces or defeat threats.
  - ▶ Provide area damage control.[7]

- *Terrain Management (conducted in the support area).* The MEB's tailored capabilities enable it to assume many of the missions formerly performed by an assortment of organizations in the division and corps rear, such as rear area operations and base and base cluster security. Usually assigned its own AO to perform most of its missions, the MEB can also perform missions outside its AO. Normally, the MEB's AO is the same as the supported echelon's support area. Within its AO, the MEB can perform a host of missions, though it is better suited to perform one or two missions simultaneously than several at the same time. Some of the missions assigned to an MEB within its AO include movement control; recovery; ISR; and stability operations. The MEB defends the assets within its AO, including bases and base clusters. Outside of its AO, the MEB can provide military police, EOD, or CBRN support to the supported commander.[8]

- *Movement Corridors.* One of the ways that the MEB performs protection missions is by establishing movement corridors to protect movement of personnel and vehicles. The MEB provides route security and reconnaissance and defends lines of communication. The figure on page 10 offers a greater overview of the MEB's mission capabilities, depicting its core capability mission-essential tasks (CCMETs) and the supporting task groups.
- *Interdependencies.* The MEB, like all the other modular brigade structures, relies on others for some of its support. When needed, the MEB must leverage fire, medical, aviation, and intelligence support from adjacent functional or multifunctional brigades. As the likely landowner of the support area, the MEB will not only have to provide support throughout the division area of responsibility but also to the other modular support brigades residing within the support area as part of its support area operations mission.

MEB Limitations

The MEB is not a maneuver organization. Although it harnesses sufficient C2 and battle staff personnel to employ a TCF in a limited role (when assigned), it does not seize terrain and it does not seek out a Level III threat. It is important that MEB commanders and staff can clearly articulate the differences between the MEB, the other modular support brigades, the functional brigades, and the BCTs.

The Way Ahead

The future of the MEB appears very positive. Its capabilities are relevant and indispensable to combatant commanders conducting full spectrum operations. The MEB receives frequent accolades from an expanding chorus of general officers. Just recently, General William S. Wallace, then commanding general of the United States Army Training and Doctrine Command, and Major General Walter Wojdakowski, Chief of Infantry and commander of the Maneuver Center of Excellence at Fort Benning, Georgia, strongly supported the need for more MEBs. Their belief is that the current and future operational environments—increasingly asymmetrical and complex—require more MEBs. In sharing their experiences from the major combat operation phase of Operation Iraqi Freedom, they remarked that an MEB or two could have played a key role during the march to Baghdad. Their assessment was that the MEB is uniquely configured to command and control all the maneuver support capabilities required to support Army operations. During the early phases of Operation Iraqi Freedom, all the critical maneuver support functions now resident in MEBs were managed in composite fashion. Most frequently, functional or maneuver brigades would assume these functions as an additional mission. Performing these vital missions was necessary to ensuring that the lines of communication remained open and the rear area remained secure. Typically, units performed maneuver support operations and support area operations missions as a secondary effort, taking their focus away from their primary mission—the march to Baghdad.

The MEB's unique design ensures its place in the Army's force structure to provide maneuver support to division and corps for the current force and for years to come. A central concept of the modular force is for each of the modular support brigades to provide seamless support to the supported commander. For its part, the MEB's tailored design assures that it can provide all essential maneuver support functions to the supported commander. While the MEB is only one part of a division force package, it too is required to ensure seamless support to the division across the spectrum of conflict. At present, there are 23 MEBs in the total force—4 in the Active Army, 3 in the United States Army Reserve, and 16 in the Army National Guard. We began to activate MEBs in 2006 and will continue to activate them through 2012. Currently, 14 MEBs have been activated and several have already deployed.

The MANSCEN challenge now is to develop a culture of leaders who can visualize, describe, and direct the many capabilities resident in the MEB to support a transforming Army.

Colonel Williams was the TRADOC Capability Manager–Maneuver Support at the time this article was written. He is now the Garrison Commander, Fort Leonard Wood, Missouri. Other assignments include Deputy Brigade Commander, 16th Military Police Brigade (Airborne), Fort Bragg, North Carolina, and Baghdad, Iraq; Commander, 342d Military Police Battalion; Director of Emergency Services and Chief, Command and Tactics Division, United States Army Military Police School, Fort Leonard Wood, Missouri. He holds a master's in counseling and leader development from Long Island University, is a graduate of the Command and General Staff College, and is a Senior Service College selectee. He was selected for brigade command in 2007.

Mr. Crider is the maneuver support integrator for the TRADOC Capability Manager–Maneuver Support. Previously, he served as a concepts analyst for the Operational and Strategic Concepts Development Team, Concept Development Division, Maneuver Support Center Capability Development and Integration Directorate (CDID), and as the senior doctrine analyst for the Directorate of Training and Leader Development, United States Army Military Police School. A retired infantryman, he is a graduate of the Command and General Staff College and holds masters' in management and in human resource development.

Endnotes

[1] FM 3-90.31, *Maneuver Enhancement Brigade Operations* (Introduction), 26 February 2009.

[2] "Our Army at War: Relevant and Ready," *Soldiers Magazine*, January 2004.

[3] Field Manual Interim (FMI) 3-0.1, *The Modular Force*, 28 January 2008.

[4] FM 3-90.31.

[5] Ibid.

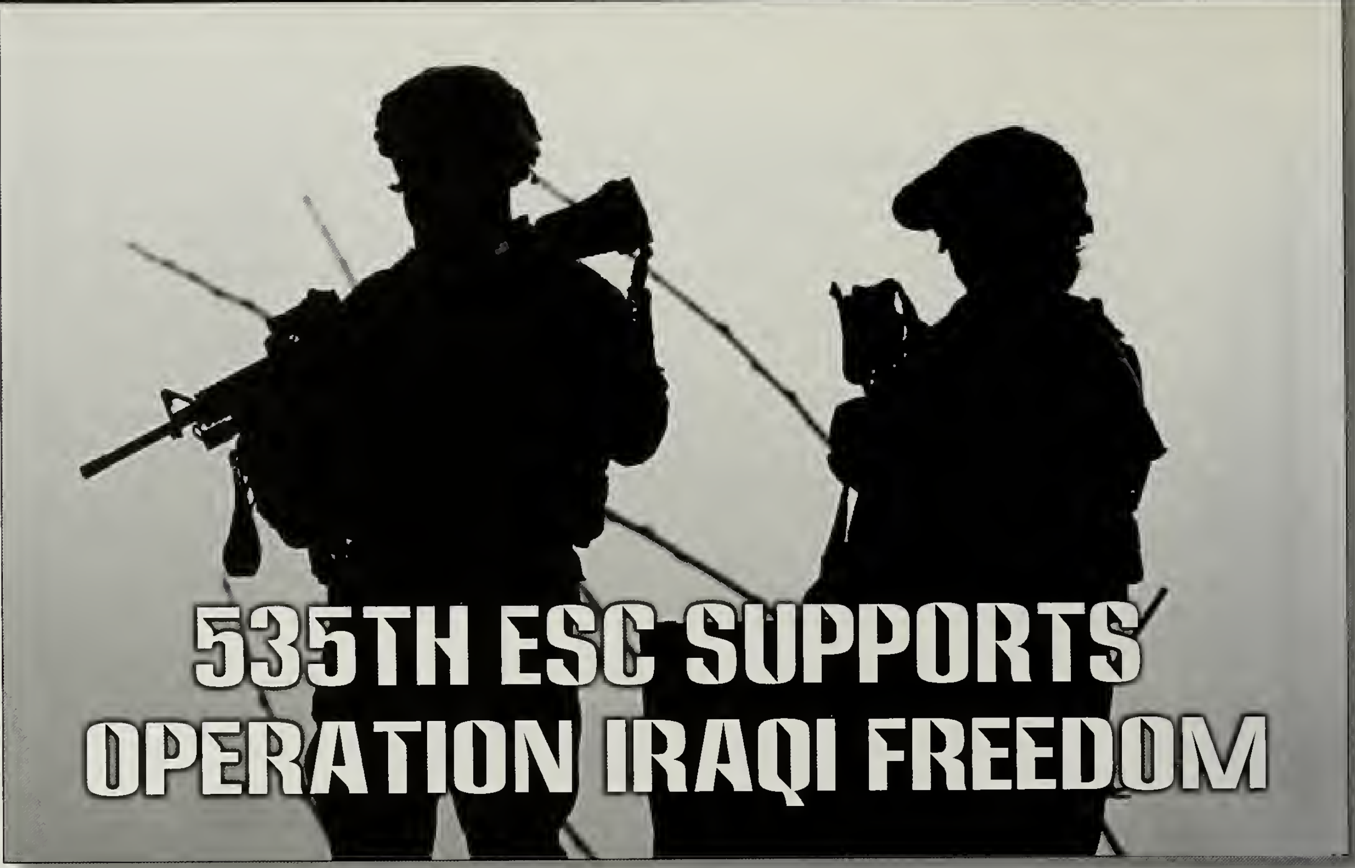
[6] Ibid.

[7] Ibid.

[8] Ibid.

A similar version of this article was published in the *Maneuver Support Magazine*, Winter 2009.

535TH ESC SUPPORTS OPERATION IRAQI FREEDOM



By Captain Kurt W. Zwoboda

Although each unit's deployment is determined by specific mission requirements and the current situation on the ground, the intent of this article is to help fellow engineer Soldiers understand and prepare for a deployment where they will face a variety of missions and challenges, such as the 535th Engineer Support Company (ESC) experienced during Operation Iraqi Freedom.

The 535th ESC is based out of United States Army, Europe (USAREUR), and falls under the 54th Engineer Battalion for command and control. The training before deployment took advantage of USAREUR's vast training resources, numerous engineer support requirements, and the number of units that passed through the garrison during annual training. The company's training consisted of four situational training exercises that focused heavily on platoon-level convoys, battle drills, and weapons training. Engineer skills training included equipment training at USAREUR's two dig sites, support to United States Army Reserve troop construction projects, engineer support to brigade combat teams (BCTs) during deployment preparation, and support to USAREUR by constructing helicopter landing pads and an improvised explosive device (IED) training lane and improving roads. The company's capstone training event was a mission readiness exercise that incorporated battle drills, a convoy live fire, medical evacuation, interaction with civilians on the battlefield, and engineer mission planning.

535th ESC Soldiers repair an IED crater.

A 535th ESC Soldier digs a burn pit.

Once deployed, the mission of the 535th ESC was to conduct base construction, force protection construction, and rapid crater and road repair and provide general engineer support to the Multinational Division Center–Iraq. During the deployment, the company served under the 3d Infantry Division and the 10th Mountain Division.

The Soldiers of the 535th ESC provided critical horizontal engineer support to four BCTs and a fires brigade in the effort to protect coalition and Iraqi army forces, prevent the flow of insurgent and extremist support into Iraq, and secure the Iraqi population. The company's support was essential to successful operations within the Multinational Division Center–Iraq.

From 22 October 2007 to 3 January 2009, the 535th ESC completed horizontal construction from start to finish for 17 base construction missions—10 patrol bases, 5 combat outposts, and 2 forward operating bases. These missions occurred in an area that extended north to south, from Baghdad to Ad Diwaniyah, and west to east, from Al Hilla to Al Kut and Al Amarah. Missions required travel time from as little as 1 hour per convoy leg to a demanding 12 hours per convoy leg to reach the engineer objective. Each base construction mission had associated tasks that included construction of perimeter walls, vehicle fighting positions, entry control points, helicopter landing zones, and road networks; clearing, grubbing, and leveling of interior surfaces; and emplacement of gravel, concrete force protection barriers and towers, and drainage systems.

The company received convoy security and haul asset support from the battalion's forward support company for a majority of its missions. The additional haul assets provided essential support to the company as it transported up to 20 pieces of engineer equipment per base construction mission. The bill of materials for the base construction was delivered by BCT haul assets, contracted Iraqi assets, or the engineer battalion's forward support company. The haul asset support enabled the 535th ESC to focus its engineer effort on construction as opposed to transporting equipment and material. This enabled the company to maximize its engineer effort and provide horizontal engineer support to five separate maneuver units throughout the division.

The result of these construction missions was critical force protection and life support areas that allowed more than 6,000 maneuver forces to execute both lethal and nonlethal operations to secure the area of operations and protect the Iraqi people. On average, each mission required a platoon's worth of engineer effort and lasted four weeks. During this time, the Soldiers of the 535th ESC also completed horizontal construction expansion of 10 existing combat outposts and patrol bases.

Each base expansion mission required specially tailored engineer teams that displayed the leadership abilities of the company's team leaders, squad leaders, platoon sergeants, and platoon leaders, who at times were required to execute small-unit missions at separate locations. Soldiers demonstrated their resilience during extended missions in austere conditions that rarely had an established infrastructure. They also demonstrated their versatility on a wide range of engineer equipment that was in addition to the company's modified table of organization and equipment (MTOE). Many missions also required Soldiers from the company to work side-by-side with their Iraqi Army counterparts in the partnership program to transition more operational control to the Iraqi Army.

The Iraqi Army partnership missions required Soldiers to be both Soldiers and diplomats as they executed their mission and engaged in the daily lifestyle of their Iraqi partners.

Throughout the deployment, it was imperative for the company to have and execute a detailed recovery plan following completion of each mission. On average, each platoon had approximately 6 days between each base construction mission, although on one occasion a platoon had as little as 36 hours after completing a 45-day mission. By identifying and assigning recovery tasks in detail, the company was able to efficiently recover equipment and personnel in a short time. Despite having detailed plans, it was important that each Soldier was physically and mentally prepared for a demanding operational tempo.

In addition to base construction missions, the 535th ESC also conducted rapid crater repair missions. These dangerous missions brought the Soldiers of the company into the lead elements of the maneuver force task organization while they strived to maintain the momentum of operations. The Soldiers of the company trained on unfamiliar concrete equipment, learned the concrete trade, and traveled throughout the operational environment repairing IED craters so maneuver forces and the Iraqi people could travel without interference.

The company's rapid crater repair missions required dedicated planning and coordination with route clearance support to ensure that blast craters were free from additional explosives, a planning aspect that sometimes saved Soldiers' lives when explosives were located. The success of the mission depended on the platoon's ability to secure the objective, prepare the ground, place the concrete, and maintain constant vigilance to ensure the platoon's security while the concrete cured. During the deployment, the company also conducted large-scale crater repair missions, which were necessary because of IED and vehicle-borne IED attacks. These missions tested the company's ability to work with large quantities of concrete.

In addition to crater repair, the company also completed extensive road repair on multiple routes and nearside and farside bank preparation for the installment of assault float bridges and constructed boat slips that enabled maneuver forces to cross and patrol Iraqi rivers. The company's only inside-the-wire mission in support of Multinational Force–Iraq was to improve a fitness center gravel parking lot. This project was completed to commemorate Medal of Honor recipient Sergeant First Class Paul R. Smith.

In addition to the three horizontal platoons' efforts, the headquarters platoon and maintenance platoon conducted the daily operations and maintenance operations that were required to keep the company functioning. Headquarters platoon maintained 24-hour command post operations throughout the deployment to facilitate information reporting and dissemination and assisted in the development of courses of action for each mission. The communications section maintained all company blue force tracker and communications systems and served as the company's

535th ESC Soldiers prepare the approach for an assault float bridge.

school-trained electronic warfare support and coordination center. The communications section also conducted monthly video telecommunications with the home station in Germany to help improve communications and morale between Soldiers and their Families.

A Soldier from the 535th ESC fills barriers.

The proper selection of personnel for the headquarters platoon was essential for effective mission preparation, coordination, and control. Proactive individuals made a tremendous contribution to the success of the mission and the care of Soldiers. Vast amounts of resources were available to support the company; the key was to know where to obtain the resources. Through persistence and individual initiative to explore opportunities, the company coordinated for additional armored engineer and wheeled equipment, additional electronic countermeasure coverage, and enrollment of equipment in the available maintenance reset programs.

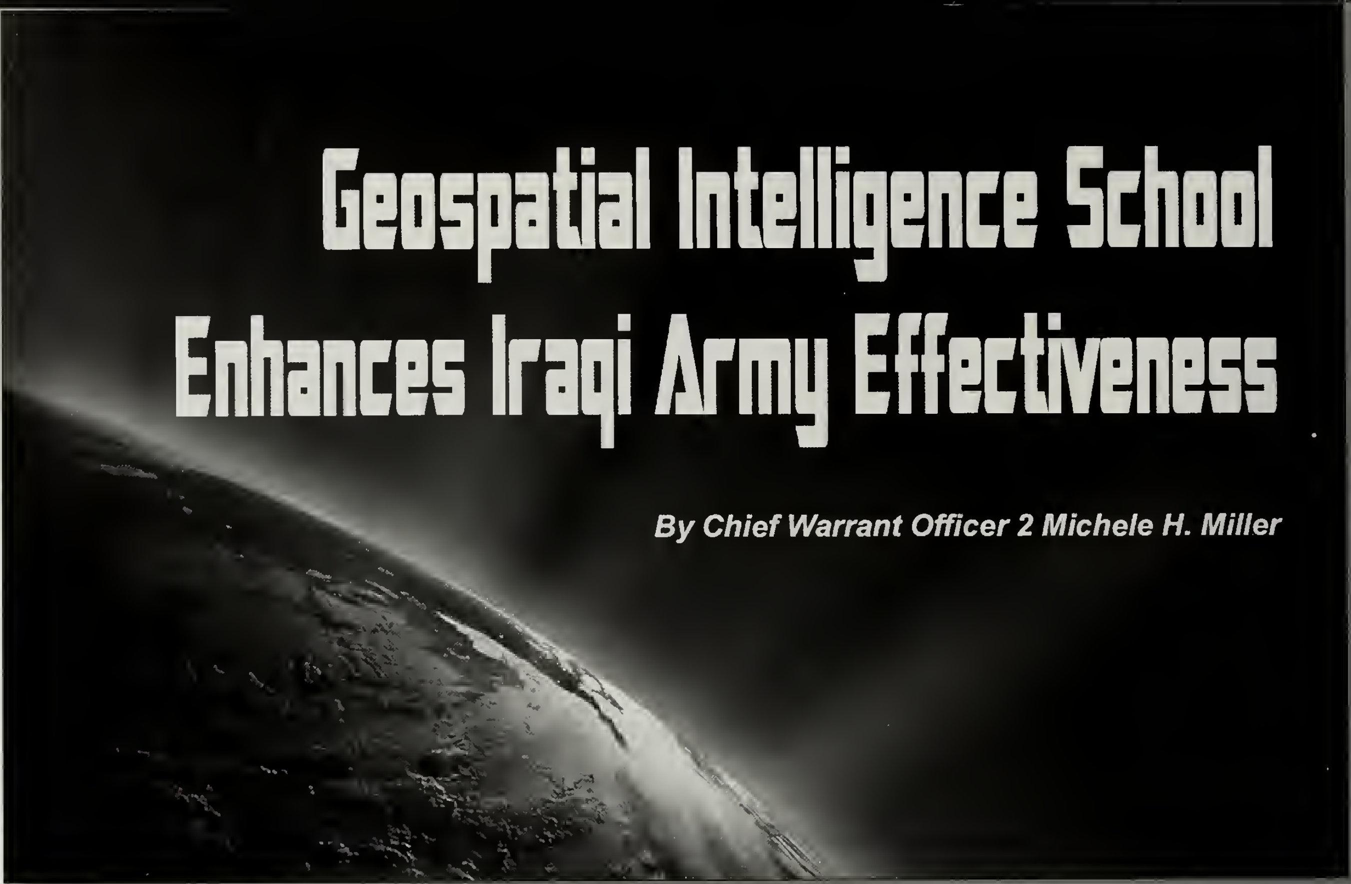
The headquarters platoon integrated the latest situation and intelligence available into each mission plan and adjusted execution if necessary. This required a command post where all Soldiers were aware of the situation and were eager to contribute to the overall mission. An important factor in successful preparation was to assist the engineer platoons by requesting and coordinating route clearance, engineer dog teams, unmanned aerial vehicles, and air weapons teams.

The supply section maintained accountability of $42,000,000 worth of theater-provided equipment and organic equipment through the enforcement of monthly inventories. The section also coordinated all classes of supply to support and sustain each engineer platoon while conducting missions in remote locations. This section, along with the executive officer, also coordinated a company-level Class IV yard that consisted of crushed rock, sand, culverts, Pavemend®, and Quickrete®. This small supply of Class IV materials was valuable during missions that required quick execution or when the BCTs did not have the material available to support requested engineer assistance.

The maintenance platoon provided company-level maintenance on 169 pieces of engineer and wheeled equipment, which included 47 pieces over the company's authorized strength. Despite the added responsibility, the platoon still maintained a 94 percent on-hand equipment operational readiness rate, which sustained the company throughout the 15-month deployment. Support from civilian-contracted mechanics was important during maintenance-intensive periods. The maintenance platoon also task-organized its Soldiers into three maintenance support teams that were embedded in the engineer platoons during each mission. This was essential for maintaining equipment and accomplishing each isolated engineer mission.

Because of the 535th ESC, fellow Soldiers throughout the Multinational Division Center–Iraq operated from protected bases and traveled more easily through the operational environment. The lives of Iraqi people in the area were improved by coalition and Iraqi force security gains that could only be accomplished after the engineers of the 535th ESC established the force protection footprint. As the sole horizontal engineer company in support of the Multinational Division Center–Iraq, the 535th ESC's contributions were essential to the success of the 3d Infantry Division and the 10th Mountain Division.

Captain Zwoboda commanded the 535th Engineer Support Company at the time this articles was written. He is now an observer-controller at the Joint Multinational Readiness Center, Hohenfels, Germany. Previous assignments include platoon leader in the 320th Engineer Company and various staff positions, and he has served in Germany, Afghanistan, and Iraq. He holds a bachelor's from Boston College and a master's from the University of Missouri–Saint Louis.



Geospatial Intelligence School Enhances Iraqi Army Effectiveness

By Chief Warrant Officer 2 Michele H. Miller

> *"Those who do not know the conditions of mountains and forests, hazardous defiles, marshes, and swamps cannot conduct the march of an army."*
>
> *—Sun Tzu*

In the summer of 2007, the Multinational Corps–Iraq (MNC–I) Engineer Directorate (C-7) facilitated an initiative to develop a geospatial intelligence (GEOINT) school for the Iraqi Ground Forces Command. Although a mapping and survey branch previously existed in the former Iraqi Army, it had conducted little formal mapping, and its surveying and map production ceased altogether after the Iraqi Army was disbanded. The new school established by MNC–I C-7, known as the Iraqi Mapping and Survey School (IMSS), provided training to enhance Iraqi Army and Iraqi Ground Forces Command understanding of the operational environment using GEOINT.

GEOINT consists of imagery, imagery intelligence, and geospatial information. It is the exploitation and analysis used to describe, assess, and visually depict physical features and geographically referenced activities on the earth. During mission planning, GEOINT products provide an understanding of complex route intersections, interchanges, bridges and buildings, which in turn improves situational awareness for commanders and allows staffs to develop courses of action and plans based on accurate data. GEOINT, merged with other intelligence sources, eliminates the need for repeated and unnecessary reconnaissance. This added capability for the Iraqi Ground Forces Command and Iraqi Army staffs resulted in a better-trained, informed force that was properly equipped to defeat insurgents in Iraq and improve stability, thereby setting conditions for sustainable security. This in turn helped coalition forces transfer more responsibilities to Iraqi security forces.

Vision

With recommendations from the National Geospatial-Intelligence Agency (NGA), MNC–I C-7 formulated basic start-up requirements and in early 2008 briefed Iraqi officials on the school's mission. MNC–I C-7, in coordination with the 100th Topographic Engineer Company, 20th Engineer Brigade, XVIII Airborne Corps, implemented plans to develop the IMSS. Desktop computers, laptops, and global positioning systems were purchased and an Arabic linguist was hired to translate materials. In addition, four Soldiers from the 100th Topographic Engineer Company were assigned to the school as instructors/advisors.

Mission and Training

MNC–I C-7 designed the IMSS, located in an Iraqi intelligence compound, to advance GEOINT and topographic mapping capabilities within the Iraqi Army and Iraqi Ground Forces Command. IMSS students are introduced to geospatial information systems (GIS), including functional uses of GIS in operational support settings. The IMSS training conforms to curriculum standards used at NGA's college. Subjects include, but are not limited to—

- Fundamentals of GIS.
- Tactical decision aids using ESRI® ArcMap™.

An American Soldier displays the first Arabic map of Iraq produced by an Iraqi geospatial officer in a precursor to the current Iraqi mapping and Survey School.

- Military aspects of terrain (observation and fields of fire, cover and concealment, obstacles, key terrain, avenues of approach [OCOKA]).
- Military briefing techniques.

Courses are translated into Arabic to allow for sufficient lecture time and practical exercises. Blocks of instruction are formulated into a set of five 3-week sessions. They are technologically challenging and require advanced knowledge of computers, engineering, and geographic terminology.

Due to the complexity of information covered at the IMSS, Iraqi applicants must have a record of academic achievement. The school accepts company grade engineer or military intelligence officers with degrees in computer science, computer engineering, earth or environmental science, geography, geology, or survey engineering. Exams in basic mathematics, English skills, and literacy are administered before admission, and candidates undergo an intensive vetting process.

Benefits

Upon successful completion of courses, students leave the school able to use GEOINT products for their unit's benefit. To date, six Iraqi Army divisions have each received two IMSS graduates, a laptop computer, and two desktop computers loaded with terrain analysis software and an extensive collection of releasable imagery, elevation data, and urban-area feature data sets. Graduates are creating tactical decision aids and terrain visualization products pertinent to unit mission requirements. These products have proven essential to military planning at the small-unit level. Several products were instrumental in capturing high-value targets during Iraqi Army and Iraqi Ground Forces Command missions in Baghdad, and the units involved received recognition from United States Army Central Command officials.

Advancement and Transition

The IMSS began as a "proof of principle" to facilitate development of a critical operational and intelligence capability in the Iraqi Army. Today, joint and interagency relationships with Multinational Security Transition Command–Iraq (MNSTC–I) and the NGA continue to advance GEOINT capabilities for the Iraqi security forces and other Iraqi directorates. At the Military Intelligence Academy–Taji, an intermediate GEOINT course is now conducted. Of the 24 Iraqi students who recently graduated from the coalition-led course, 7 were designated as instructors. They now teach the course with the coalition in a supporting role. MNSTC–I and NGA have also developed an advanced GEOINT course and are training Iraqi students as future instructors. The NGA commitment to building this GEOINT training capability ends in December 2009, with hopes that Iraqi instructors will eventually visit NGA training in the United States in order to continue this partnership and provide ongoing professional development to key Iraqi leaders. Operational effectiveness for the Iraqi Army and Iraqi ministries rests on their knowledge and application of geospatial intelligence, imagery analysis, and geodetic surveying. To that end, the IMSS is vital to mapping a way toward Iraqi geospatial independence.

Chief Warrant Officer 2 Miller was assigned to the Multinational Corps–Iraq C-7 as a geospatial plans officer. Now she is a geospatial information technician in the 100th Topographic Engineer Company, Fort Bragg, North Carolina. Past assignments include the 41st Fires Brigade, Fort Hood, Texas, and 33d Topographic Engineer Detachment, Korea.

Rebuilding Iraq With Alternative Energy Solutions

By Captain Robert T. Moore

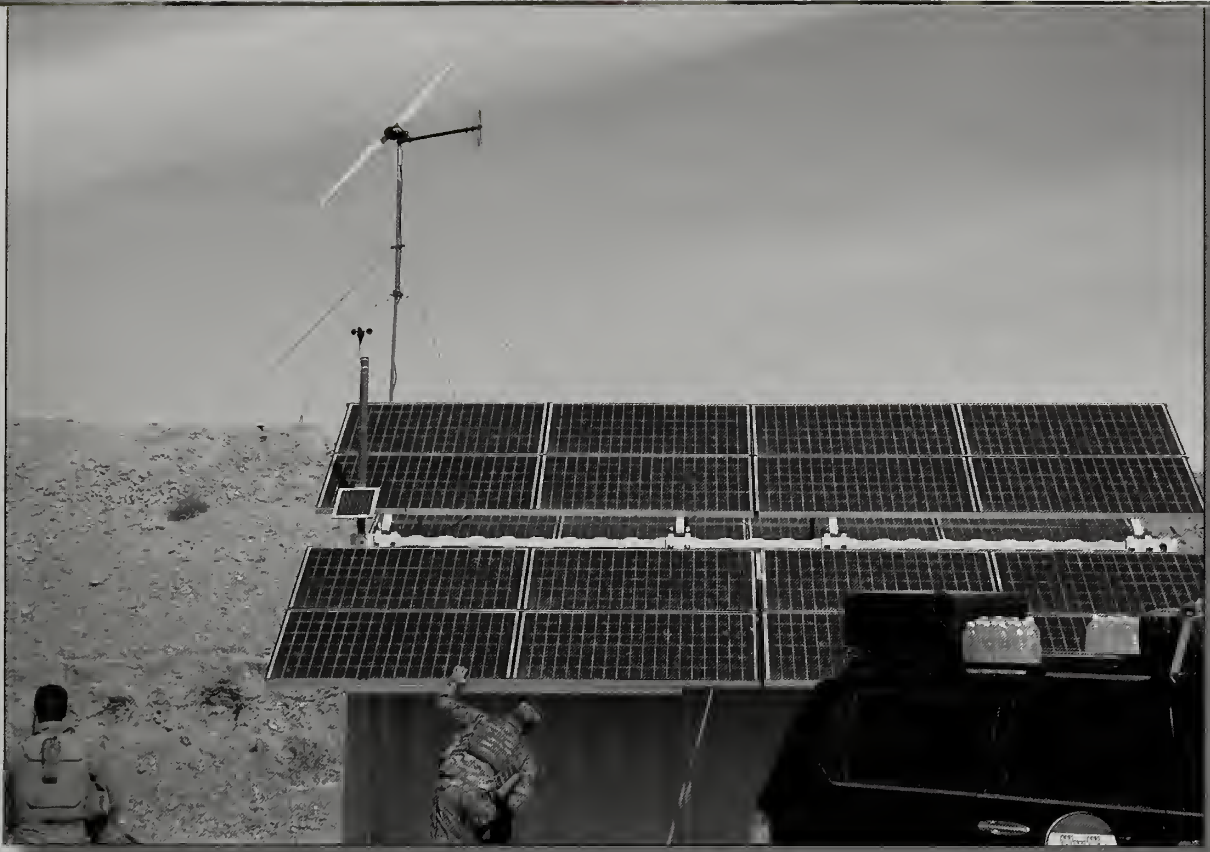
Iraq is blessed with one of the world's largest reserves of crude oil; sadly, the country has little or no refining capability. The lack of petroleum products makes it difficult to run generators and other equipment that produce reliable electricity. Consequently, every day, major cities and towns in Iraq suffer through prolonged power outages. This presents critical problems for high-security facilities, like border-crossing points, that need uninterrupted power but are so remote that they cannot be connected to the national power grid.

Fortunately, the engineering arm (J-7) of the Multinational Security Transition Command–Iraq (MNSTC–I), in partnership with the United States Army Corps of Engineers, is funding and building alternative energy systems for these more remote locations.

In particular, the MNSTC–I J-7 team has designed a unique, rugged system leveraging both solar panels and a large wind turbine—affectionately referred to as "energy in a box"—at one border-crossing location. There, the combination system will be connected to the appropriate switch gear, allowing either power source, or both, to generate electricity, depending on the environmental conditions.

Remote outpost building on the Iraq border

The wind turbine will be capable of generating 500 kilowatt hours of electricity at a wind speed of only 12 miles an hour. Additionally, 24 solar panels are being installed that can provide more than 5,000 watts of peak power. Fortunately, Iraq has plenty of sunshine during the summer



MNSTC–I inspection of solar panels and wind turbine

season when temperatures reach 135 degrees Fahrenheit. During the evening, there is also a surprising amount of wind blowing across the border between Iraq and Iran that can drive wind turbines.

The Iraqi border enforcement teams will run the systems. The coalition forces (through our contractors) will provide in-depth training to the Iraqis on how to operate and maintain the facilities. Costs vary greatly, depending on the amount of electricity needed to power the facility and whether solar panels, wind turbines, or a combination is used. Much of the equipment is covered by multiyear warranties, and the material, which is very reliable, should last for a long time if properly maintained. In addition, the costs are actually less over the long term compared with the expense of transporting fuel to large generators every week.

Presently, there are two sites where solar panels are being used. The first site has a solar-panel array that powers a water-well pump. The second site employs not only a full array of solar panels but also a large wind turbine. The alternative energy strategy is actually a test case that will be used to accumulate data so the Iraqis can evaluate the feasibility of establishing similar sites across the country. Coalition forces from MNSTC–I will record the wind and solar data and determine the success of both systems. The engineers can then determine the right mix of solar and wind solutions for other locations in Iraq.

In November 2009, this test facility became the first fully operational endeavor of its kind in Iraq. The J-7 team is evaluating various locations in Iraq, and through these efforts, the trainers and advisors from MNSTC–I are helping Iraqis build capacity and increase capability for their power infrastructure.

With the movement out of cities, towns, and villages by U.S. and coalition combat forces, Soldiers have adapted to a critical, noncombat support, such as training Iraqis to operate and maintain basic services. Even as MNSTC–I turns Iraq's infrastructure over to local government agencies, the J-7 will still be able to assist with new alternative energy solutions throughout the country.

Iraq's infrastructure is being rebuilt and restored. New roads, bridges, highways, electrical lines, and buildings are being erected. These provide the Iraqi people with the essential infrastructure they require to not only survive but also to prosper. Throughout Iraq, facilities have been restored to more normal conditions. Where there was no electricity available, new power lines from a national grid are being installed. Where there was no basic sewer and sanitation available, new septic systems are being built and wastewater treatment plants are being repaired and upgraded.

Even in a country located above expanses of oil, alternative energy programs featuring combined solar panels and wind turbines could be the answer to producing reliable electricity. Through these and other efforts, the trainers and advisors from MNSTC–I are building capacity and increasing capability of the Iraqi infrastructure. As Iraqis begin to shoulder more of the responsibility for operating and maintaining their facilities, their dependence on the coalition for assistance will diminish.

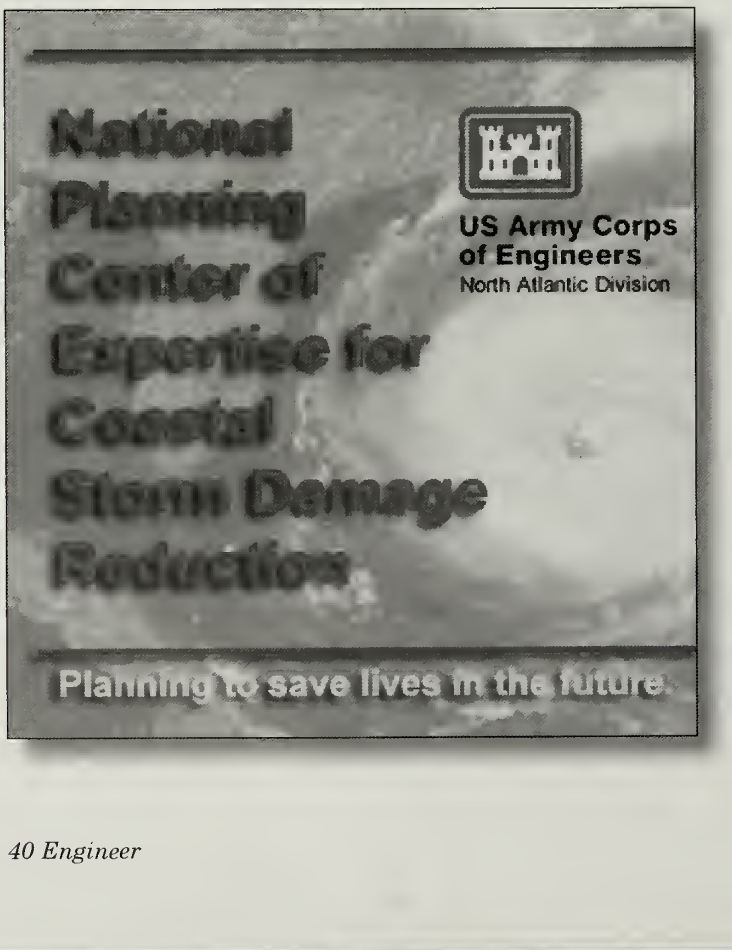
Captain Moore is a United States Army Reserve officer assigned to the Multinational Security Transition Command–Iraq (MNSTC–I). He holds a bachelor's in engineering from the United States Military Academy and a master's in business administration from the University of Michigan. He is a registered professional engineer in Virginia.

Army Corps Team Has "Eye" on New Orleans Safety:

Hurricane Season 2009

By Dr. JoAnne Castagna

The day Hurricane Katrina hit New Orleans, Louisiana, in 2005, a program manager with the United States Army Corps of Engineers (USACE), North Atlantic Division, was in his office reviewing the region's flood risk management projects online. Little did he know that in the near future, he and his fledging coastal storm damage team would be asked to travel to New Orleans to see Katrina's devastation firsthand and perform a safety assurance review, ensuring that the Corps's rebuilding efforts would make the region safer for the citizens of New Orleans.


National Planning Center of Expertise for Coastal Storm Damage Reduction
US Army Corps of Engineers
North Atlantic Division
Planning to save lives in the future.

When the 2009 hurricane season began in the Atlantic in June 2009, New Orleans residents were less vulnerable than they were the day after Katrina, due to the rebuilding efforts. However, they are still at some risk, even though the rebuilding has been moving aggressively forward by the Corps's New Orleans District and the Hurricane Protection Office. Both organizations are being led by Task Force Hope, an arm of the Corps's Mississippi Valley Division. Task Force Hope is on a tight deadline to get more than 200 designs and build storm damage risk-reduction features—to be up and running by 2011—that include hurricane barriers, floodwalls, levees, and pumping stations.

Task Force Hope asked the National Planning Center of Expertise for Coastal Storm Damage Reduction team to provide their review services, including a safety assurance review. This group is one of six national planning centers of expertise that USACE created to provide specialized services to the entire Corps. The team provides USACE personnel and non-USACE agencies throughout the world advice and resources on all aspects of coastal planning, including coastal storm damage reduction, regional sediment management, and affiliated ecosystem restoration water resource needs.

One of the main services the team provides is leading independent external peer reviews (performed by a panel of experts outside of USACE and gathered by an outside scientific agency) and agency technical reviews (performed by USACE personnel not associated with the projects being reviewed). The reviews are regarded as important, since they provide the public assurance that additional scrutiny is involved in their safety issues.

New Orleans West Bank floodwall—part of Task Force Hope's risk-reduction efforts

Katrina became a Category 5 hurricane just hours before making landfall and unleashing the highest storm surge on record in the United States. After Katrina hit land, a team was still just being formed—but when the Corps was called on ultimately for planning services, forty of their best specialists throughout the nation were immediately flown to New Orleans, where they had to "hit the ground running." A program manager with the Corps's Baltimore District pointed out that the safety assurance review their team is doing is being performed by an independent external peer review panel. By law, USACE is required to perform safety assurance reviews for flood damage reduction and coastal projects. This review is ensuring that Task Force Hope's original evaluation in their designs and construction assumptions and decisions remains a good solution, as new information is gained and adjustments to the design and construction are made. The only ongoing safety assurance review currently being conducted in USACE is the one for Task Force Hope.

When Task Force Hope completes its work, according to the Corps's Baltimore District, the entire USACE will benefit by its declared advantages from the safety assurance reviews by an independent external peer review panel, including—

- Ensuring robust, resilient, and reliable USACE projects from planning through design and construction.
- Assessing and reassessing assumptions from earlier project phases once more actual data becomes available during the design and construction phases.
- Making best use of project time and money, especially when dealing with changeable areas on a project. For example, some projects may have to switch from one type of flood risk reduction method to another—such as from using a levee to using a floodwall or switching to using a nonstandard type of protection such as an extra large pump station.
- Assuring the public that "another set of eyes" is used in conducting project reviews that pertain to their safety.

The Corps's North Atlantic Division has noted that the team's level of support to the mission has been "tremendous." By making themselves available through vacations and holidays, the Corps has shown that their support wasn't just a job for them, but rather wanting to be part of the effort to help the citizens of New Orleans. There is pride in working on what is currently the largest civil works mission for USACE. Additionally, the safety assurance review will provide for improved risk reduction to the New Orleans area, since if storm surges similar in strength to those created by Hurricane Katrina are produced, there will be a lower risk of loss of life and infrastructure damage to homes and businesses.

To learn more about the USACE National Planning Center of Expertise for Coastal Storm Damage Reduction and the services it provides to the Corps, visit <*www.nad.usace.army.mil/natplan.html*>.

Dr. Castagna is a technical writer-editor for the United States Army Corps of Engineers, New York District. She can be reached at <joanne.castagna@usace.army.mil>.

OUTCOMES-BASED TRAINING: SOLDIERS AS LEADERS

By Command Sergeant Major Douglas S. Padgett and Lieutenant Colonel Richard A. Pratt

> *"As a command sergeant major [CSM], I am truly impressed by the Soldiers that come through this battalion. I believe that they are extremely smart, innovative, and flexible. This excites me because I believe they are the future leaders who will win the War on Terrorism. The battle that our Soldiers will face is asymmetrical warfare and not the conventional fight. The enemy is strong, smart, and adaptive. To win this battle, we must produce Soldiers that are innovative and ready to contribute immediately to their first unit. The outcomes-based training model fits directly into Major General Martin's vision to build great engineers with full spectrum capabilities."*
>
> *–CSM Douglas S. Padgett*

Transformation of our warfighting doctrine has driven changes in the way we train initial-entry Soldiers. Some of the training events and tasks are the same, but a lot of what we do in the training base is focused on preparing Soldiers for immediate deployment to the current fight. There is a real focus on refining training through the implementation of an "outcomes-based" training model,[1] and this has greatly transformed how we in the 31st Engineer Battalion view the training of Soldiers—not only in basic skills such as warrior tasks and battle drills, but in the development of initial-entry training (IET) Soldiers as future leaders, prepared to accept the challenges of evolving warfare across a full spectrum of operations (see Figure 1).

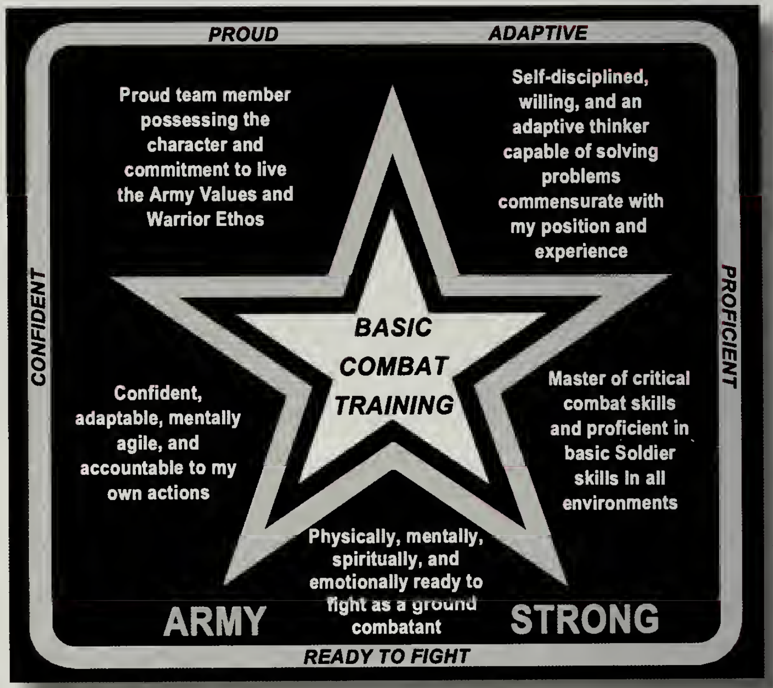

PROUD
ADAPTIVE
Proud team member possessing the character and commitment to live the Army Values and Warrior Ethos
Self-disciplined, willing, and an adaptive thinker capable of solving problems commensurate with my position and experience
CONFIDENT
PROFICIENT
BASIC COMBAT TRAINING
Confident, adaptable, mentally agile, and accountable to my own actions
Master of critical combat skills and proficient in basic Soldier skills in all environments
Physically, mentally, spiritually, and emotionally ready to fight as a ground combatant
ARMY
STRONG
READY TO FIGHT

Figure 1. The five outcomes (Fig. 1-1 from *The Drill Sergeant Handbook*)[2]

The process of developing leaders in the Army (at all levels) is fairly straightforward; we allow them to—

- Develop a plan.
- Prepare to execute the plan.
- Conduct the operation.
- Assess and evaluate the results through self-analysis and external feedback.

We see this formula as lieutenants take charge of their first platoons. We also see it in every rotation at the National Training Center, the Joint Readiness Training Center, and the Joint Maneuver Readiness Center, where the observer-controllers allow Soldiers to take chances and calculated risks in a controlled environment. They teach and test leadership by allowing leaders to act, succeed, and make mistakes—then access their strengths and shortfalls, which in turn builds confidence, esteem, and discipline. This proven model of leadership development trains and evaluates Soldiers in all five of the categories of learning (see Figure 2, page 41). We find that in the IET environment, we can teach Soldiers to be leaders at the same time that we are teaching them the basics of soldiering. In fact, for many Soldiers, the additional stress of being placed in a leadership position helps them perform at their peak level.

As Soldiers enter IET, they are immediately given tasks to build teamwork and instill a sense of accomplishment and confidence; this is the first step to building leaders. We believe that on Day One of training, Soldiers should be given missions to accomplish and be evaluated on their ability to participate as a member of a team. This is definitely a paradigm shift from the days of being told step-by-step what to do and how to do it. Several Soldiers are selected by the drill sergeants to serve as squad leaders and/or platoon guides (platoon sergeants). The newly selected leaders have only their "brevet rank" and the innate leadership traits they brought

Basic Categories of Learning

Facts/Rote Memory: ***Recite the military rank, chain of command, three general orders, and The Soldier's Creed***

Procedures/How To: ***Operate a radio, conduct first aid, set up a shelter half, establish a checkpoint***

Motor Skills: ***Use a bayonet to defend yourself, engage targets with an M16A2, engage combatives***

Problem Solving: ***Employ troop-leading procedures; react to various scenarios; assess mission, enemy, terrain, troops, time available, and civilian consideration (METT-TC)***

Attitudes: ***Maintain self-discipline, teamwork, Seven Army Values***

Figure 2

with them to effectively lead their peers (who possibly outrank them with private second class or private first class rank earned while serving at their home station) through the trials of engineer one-station unit training (OSUT).

Soldiers serving in leadership positions quickly learn additional leadership skills through observation and individual training from their drill sergeant on how to direct the actions of their newly assigned unit. It is exciting to see the drill sergeants working with the student leadership to accomplish the mission, and it is a process that develops "followers" and "leaders" concurrently. In fact, as the drill sergeants rotate the student leadership positions, Soldiers see the real value in being good team members and supporting the current chain of command—especially as they hope to have the full support of their peers if and when they are put in charge.

"When I was a drill sergeant"—a common phrase often heard among senior noncommissioned officers—"Soldiers were told where to be, how to get there, how to accomplish the mission, and who had to do it." This old tradition didn't allow Soldiers to understand the process of problem-solving (which leads to mission accomplishment), to take initiative, or to develop their own leadership skills. A common cliché among training platoons now is "Lead the way, drill sergeant, and we will follow."

We have challenged our drill sergeants to look at their Soldiers not as "trainees," but as the members of their operational squads and platoons. Drill sergeants give warning orders and operations orders and conduct troop-leading procedures, precombat checks, and precombat inspections (see Figure 3). Once they teach the students to use these techniques, they watch the student leadership execute the mission. Soldiers are given the mission of assisting with morning accountability and reporting; monitoring training schedules and timelines; leading after-action reviews; and leading the battalion commander and CSM through inspections.

Leader actions demonstrated during the Red Phase of OSUT (weeks 1–3) look distinctly different from those in the Blue Phase (weeks 6–8). By the end of the Blue Phase, student leaders are conducting combat patrols during a field training exercise that culminates with combat operations through the Night Infiltration Course (a simulated raid conducted under direct enemy fire with M240B machine guns live-fired directly above their heads).

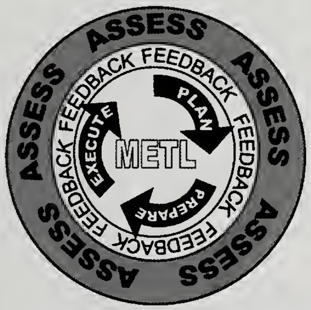
Key Concepts

Troop Leading Procedures

1. **Receive the mission**
2. **Issue a warning order**
3. **Make a tentative plan**
4. **Initiate movement**
5. **Conduct reconnaissance**
6. **Complete the plan**
7. **Issue the orders**
8. **Supervise and refine—**
    a. **Precombat checks**
    b. **Precombat inspections**
    c. **Rehearsals**

Every Soldier is a Sensor (ES2)[3]

1. **Conduct after-action reviews (AARs)**
2. **Perform individual counseling**
3. **Conduct sensing sessions**



The Army training management model (Figure 4-5 from FM 7-0)[4]

Figure 3

Student leaders take charge by directing fire and maneuver, calling for status reports, and directing aid and litter teams with a level of confidence expected from a noncommissioned officer. It is a formidable task, but our success rate is high, resulting in greater pride and confidence in young Soldiers as they accomplish complex tasks while serving as leaders of these formations.

As outcomes-based training is fully implemented, we will see Soldiers who are ready to contribute immediately upon assignment to their first operational unit, drawing on more highly developed leadership abilities:

> *"I will never forget my first platoon sergeant, who saw my leadership potential and maximized every opportunity to make me successful. He provided the purpose, motivation, and direction; that was all I needed. I was given the task to ensure that the platoon's area of responsibility was always in a high state of readiness. It was then my responsibility to request the resources, plan and coordinate the tasks, and follow up and evaluate. I was in charge of some seniors, peers, and subordinates—a daunting task, but it really developed my leadership skills."*
>
> *–CSM Douglas S. Padgett*

Outcomes-based training applies this same idea; it pushes young Soldiers to learn several different concepts at the same time, including basic tasks, with the underlying theme of training Soldiers and developing them as leaders. Beginning the process of leader development early during basic combat training provides our Army with better-trained, more confident, and more proficient Soldiers.

Command Sergeant Major Padgett is the command sergeant major of the 31st Engineer Battalion (OSUT) at Fort Leonard Wood, Missouri. He is a former drill sergeant and senior drill sergeant leader at the Maneuver Support Center Noncommissioned Officer Academy and Drill Sergeant School. He holds a bachelor's in applied management from Excelsior College and is a graduate of the United States Army Sergeants Major Academy.

Lieutenant Colonel Pratt is the former commander of the 31st Engineer Battalion at Fort Leonard Wood, Missouri. He holds a bachelor's in engineering technology from Norwich University and a master's in education from Long Island University. He is also a licensed professional engineer in Virginia.

Endnotes

[1] "Outcomes-based training is a philosophical approach to military training that stresses the end state of the Soldier's mental intangibles, attributes, and skills required by the commander for combat. The training is guided by the commander's intent and unit initiative to obtain the greatest effectiveness and is not focused on process-driven requirements." *Drill Sergeant Handbook*, Chapter 1, "Knowledge," 1 January 2009, Directorate of Basic Combat Training (DBCT) Center of Excellence (COE).

[2] Center for Army Lessons Learned, No. 09-12, *Drill Sergeant Handbook*, 12 January 2009, Figure 1-1, page 7.

[3] Moving away from the notion of the "intelligence officer" and toward human intelligence-gathering operations at every level is the concept of "every Soldier as a sensor (ES2)." Torchbearer National Security Report, June 2005, <*www.ausa.org/programs/torchbearer/nsr*>, accessed 5 October 2009.

[4] Field Manual 7-0, *Training for Full Spectrum Operations*, 12 December 2008, Figure 4-5, pages 4-14.

New Army Field Manual
FM 5-0, *The Operations Process*

U.S. Army Combined Arms Center
"Intellectual Center of the Army"

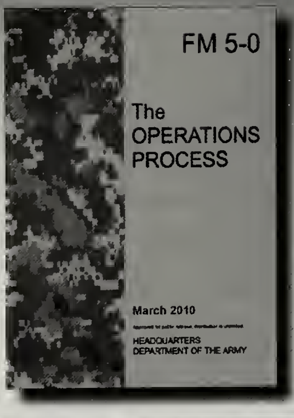
U.S. Army Combined Arms Doctrine Directorate (CADD)
U.S. Army Combined Arms Center (CAC), Fort Leavenworth, KS 66027

The new FM 5-0, *The Operations Process*, expands Army doctrine on the exercise of command and control during the conduct of full spectrum operations. No longer a manual strictly concerning planning, FM 5-0 now describes the relationship of all activities of the operations process – planning, preparing for, execution, and assessing operations.

In addition, for the first time in Army doctrine, the manual weaves "design" throughout the operations process. This version of FM 5-0 provides a guide for Army leaders in understanding, visualizing, and describing complex, ill-structured problems and developing approaches to solve them.

FM 5-0 is scheduled to be available for download in March 2010 at the following Combined Arms Center website: http://usacac.army.mil/cac2/fm50/

More information may be obtained by calling the U.S. Army Combined Arms Doctrine Directorate (CADD) at: (913)684-2159/ DSN 552-2159.


FM 5-0
The OPERATIONS PROCESS
March 2010
HEADQUARTERS
DEPARTMENT OF THE ARMY

HAWAIIAN ENGINEERS SUPPORT BORDER MISSION

By Specialist Matthew H. Oda

More than 80 Soldiers from the Hawaii Army National Guard's 230th Engineer Company helped support California's Operation Jump Start Southwest border mission in April. As part of the nation's Homeland Security effort, the operation uses National Guard troops to support the United States Customs and Border Protection mission of preventing illegal crossing and drug trafficking along the border with Mexico. The engineer unit, with headquarters in Maui, worked out of San Diego and was attached to Task Force Steel Castle, the California National Guard's engineering slice of Operation Jump Start.

Soldiers build forms to surround electrical boxes and protect them from damage.

Engineering missions included retrofitting an existing fence, moving electrical boxes, and constructing a drainage ditch. The engineers tried to finish about 300 feet of the fencing project every day, straightening the galvanized steel sheeting and attaching bolts to reinforce the poles. They took only about four days to complete that portion of the project. Another team rebuilt electrical boxes along the fence line, raising them a foot aboveground to make them more visible and building concrete platforms around them as protection.

Even though many of its Soldiers were infantrymen retraining as engineers, another crew completed a brow ditch ahead of schedule. They dug the ditch and lined it with concrete to redirect rain water to a culvert, preventing the water from running down the hills and causing erosion below (see photo above.) The only obstacle the 230th faced was not having enough time to accomplish all they wanted. The Task Force Steel Castle hosts provided the materials and equipment the 230th needed to get the job done. Although many of its troops were new to the field, they were willing and motivated to learn the engineering mission.

Specialist Oda is a journalist with the 117th Mobile Public Affairs Detachment, Hawaii Army National Guard.

Transformation Challenges Soldiers

By Sergeant Roger D. Ashley

A pipeline snakes across eastern Virginia, weaving through streams and woods, tunneling under roads, and bridging difficult terrain to test Soldiers in a real-world environment. Many of the units have never worked together and have no prior experience but still they push forward. The 377th and 439th Engineer Companies also learn about the new engineer's role in the Army's future at the United States Army Forces Command's (FORSCOM's) Petroleum Training Module (PTM), an annual training event beginning in April at Fort Pickett, Virginia. Quartermaster Soldiers from Regular Army units and engineer Soldiers from United States Army Reserve units integrate and augment each other to accomplish the pipeline mission.

A small emplacement excavator pushes the pipeline through a culvert under a road.

The mission goal was to join 5,402 sections of 20-foot pipe and maintain the resulting 20-mile stretch of pipeline throughout the summer. The exercise, which entailed constructing and operating an inland petroleum distribution system (IPDS), began on 19 April and is scheduled to run through 28 September. As part of the Army's Transformation, pipeline units are disappearing and their mission is falling to vertical and horizontal

Engineers align the pipeline for clamping. The varying contours and elevations presented some challenges to Soldiers placing the pipeline.

A Quartermaster Corps Soldier steadies a joint while it is clamped. Quartermaster Soldiers augmented the United States Army Reserve engineer units as needed throughout the exercise.

construction units unaccustomed to the job. The pipeline remain in place all summer while various Reserve Component units operated it for two weeks at a time. At the end of the summer, other engineer units dismantled and retrieved the pipeline.

Research shows that a large percentage of the supply tonnage moved on the battlefield is petroleum. In World War II, Field Marshall Erwin Rommel said, "Before the shooting begins, the bravest men can do nothing without guns, the guns nothing without ammunition, and neither guns or ammunition are of much use in mobile warfare unless there are vehicles with sufficient petroleum to haul them around." During the 1970s, the United States Army researched the need for a distribution system to meet wartime needs and developed the IPDS by the mid-1980s. It is designed to be a highly mobile, deployable fuel storage and pipeline system that can be easily modified and interchanged with other types of distribution systems.

The Army identified the need for training and developed PTMs to fill the void. Each year, 700 to 1,200 Soldiers train at the PTM at Fort Pickett, which provides nearly every type of terrain Soldiers will encounter around the world. The 49th Quartermaster Brigade and the 240th Quartermaster Battalion provided command and control during the exercise, augmenting units that were understrength, providing subject matter experts, and assigning civilian contractors as trainers and liaisons. The 109th Quartermaster Company was in charge of constructing the first leg of the pipeline, from the refinery to pump No. 2. The 439th Engineer Company had the second section, and the 377th Engineer Company had the third. The fourth and final leg of the pipeline was operated by members of the Korean Service Corps, a paramilitary group formed during the Korean War to provide labor support to U.S. forces. The group has the same mission today.

The new engineer units had some obstacles to overcome. Terrain, logistics, their integration with unfamiliar units, and the training in new tasks presented the engineers with challenges to complete the mission. The engineers of both companies faced unfamiliar requirements, with many Soldiers having to take on new military occupational specialties. But the PTM's mixture of classroom instruction and hands-on training successfully helped to ease the engineers into their new jobs; the mission that was scheduled to take eight days took only five to complete.

Sergeant Ashley is a United States Army Reserve journalist with the 412th Theater Engineer Command in Vicksburg, Mississippi. He has deployed to Iraq as an engineer technician with the 130th Engineer Brigade and will deploy again soon as a construction management sergeant. In civilian life, he works as a railroad conductor for the Kansas City Southern Railway.

Operation Essayons 2009 is a year two exercise in the Army Force Generation (ARFORGEN) cycle. The focus of the exercise is to train United States Army Reserve Soldiers on engineer-specific skills at the squad level—technical training that they don't necessarily receive in other exercises or at their home station. Engineer Soldiers accomplish this by actually taking part in constructing forward operating bases (FOBs) at Fort Hunter Liggett, California. When they deploy overseas, Soldiers will live and work at the same type of base they build here.

Everyone Grab a Shovel!

By Sergeant Shawn W. Napier

Engines roaring, hammers pounding, and drills buzzing. This paints the scene at Fort Hunter Ligget, California, for an 84-man project that was well into two days of hard labor for Soldiers of the 358th Engineer Company and select Soldiers from units outside of the 358th at Forward Operating Base 8J.

On 7 May 2009, engineers of the 358th worked overtime to complete the final cement pad in a total of 10 pads that will be used as the foundation for buildings to be constructed later on Forward Operating Base 8J. The final of four pours on the 102- by 82-foot pad took place on 10 May. Fifty-four Soldiers from all types of jobs in the Army joined in with 30 combat engineers to complete the mission—a mission the engineers received only 48 hours before the cement trucks hit the site. The engineers were carpentry and masonry specialists who specialize in this type of horizontal construction.

Photo by Sergeant Shawn W. Napier

Left: A Soldier ties rebar stakes together with wire during the preparation for pouring a 102-by-82 foot pad.

Photo by Staff Sergeant Ryan Matson

Right: A carpentry and masonry specialist of the 358th Engineer Company pours concrete in an effort to complete a large concrete pad.

The engineers had been running 24-hour operations for the past two days, with volunteers coming from different military occupational specialties—many of them military police and infantry—to help with the project. Last-minute operational needs like the completion of the pad are a perfect example of the military's constant flexibility and the Soldiers' ability to adapt and overcome any obstacle placed in front of them.

As one of the Soldiers tasked with a majority of the concrete work being done on the pad, one carpentry and masonry specialist with the 358th ensured that everyone, including those unfamiliar with the particular engineering skills of their peers, contributed their best to the job. One of the volunteers working on the project was a human resources specialist with Headquarters and Headquarters Company, 494th Brigade Support Battalion, who noted that "our motto is 'wherever needed.' "

With foundations laid and cement mixers on-site, the Soldiers came out from the shade of a nearby tree. Tools in hand, they waited for the civilian contractors to arrive with the pouring machine. Then engines rolled, and immediately, those who were specialized in the craft went to work pouring the concrete into the proper channels and filling the large grid of rebar and footers. Volunteers began spreading out the concrete under the careful guidance of the masonry specialists. A human resources specialist with the 358th admitted he'd never worked with concrete before, but that it was "good cross-training."

Even though the process was in its final stages, the operation continued well into the night. Looking out at the steaming concrete that was beginning to cover the steel grid below, the first sergeant from the 494th observed that it would be two pours of concrete that day and two more the following Monday. Despite extreme conditions, long hours, and demanding expectations, Soldiers of the 358th at Fort Hunter Liggett completed their mission.

Sergeant Napier is a military journalist with the 372d Public Affairs Detachment, a United States Army Reserve unit in Nashville, Tennessee. A former infantry Soldier, he served in Iraq and recently graduated from the Defense Information School basic journalist course at Fort Meade, Maryland.

RESERVISTS BUILD STEEL BARRACKS

By Staff Sergeant Ryan Matson

"Let Us Try"—This is the motto of the Army's Engineer Branch, and it has proved to be a fitting one. Often, Army engineers are asked to build something in a field environment on short notice or without a specific blueprint to guide them and, in these cases, they rely on their training—as well as an ability to improvise—to complete the mission.

Above: A carpentry/masonry specialist with the 248th Engineer Company assists another Soldier in cutting a steel piece for the ABM.

Left: An Army Reserve Soldier with the 248th carries a steel piece used in constructing the ABM building.

Photos by Staff Sergeant Ryan Matson

Recently, 12 Army Reserve engineers from the 248th Engineer Company in Dallas, Texas, employed the branch motto by building three steel barracks buildings during their two-week extended combat training as part of Operation Essayons at Fort Hunter Liggett, California. The engineers arrived at Hunter Liggett on 25 April 2009 and received one day of training from a civilian contractor on constructing automatic building machine (ABM) steel buildings. By 10 May, the small crew of engineers had built three 50- by 30-foot steel barracks-style buildings. The high-arched buildings, on concrete pads and constructed almost entirely of steel, are named after the machine that crimps and bends the 14-gauge steel pieces from which the buildings are constructed.

The Soldiers of the 248th had been briefed on all the missions in the operation, though they did not know exactly what their specific mission was until the next day. They had a four-hour course on the machine, then started rolling; fortunately, their ranks included two welders to weld the bottom to the plate.

Since the Soldiers received somewhat limited training, some obstacles surfaced during construction—for example, the main challenge on the ABM was getting the links right. One of the lessons the engineers learned in cutting and forming the metal pieces was dealing with the dramatic temperature changes in California over the course of a workday, since the metal contracts and expands, depending on the temperature outside. The second morning they were there, they were cutting measured pieces, and it stayed around the same temperature the first week, so things went smoothly. The next week was more of a challenge, since they were hitting their measurements which, within an hour to two, were coming out different. The engineers learned that in the morning they had a limited time to cut their pieces for that workday.

The crew from the 248th displayed their skills in completing the mission despite coming from a variety of different full-time civilian occupations. All have received Army training as engineers, and many work in related fields in civilian life—but some do not. One carpentry and masonry specialist is a bartender in Dallas when he is not serving with the unit. He joined the Reserves shortly after the 11 September 2001 attacks on the World Trade Center, wanting to do what he could, in addition to learning a new trade and becoming more well-rounded.

Despite obstacles, the engineers were able to stand up another ABM building every three to four days. Calling the company "lucky" since it had the "right guys" for the job, one combat engineer with the 248th discovered that they were the only crew to build the ABMs without assistance from civilians—a job usually requiring 30 to 60 men, and they did it with only 12.

Staff Sergeant Matson is a military journalist with the 372d Public Affairs Detachment, a United States Army Reserve unit in Nashville, Tennessee. He is a journalism graduate of Penn State University and has been an Army journalist since 2001, deploying to Iraq with the 101st Airborne Division in 2005. In civilian life, he is a police officer in Nashville.

ENGINEERS BUILD BASE AT FORT HUNTER LIGGETT

By Specialist Francesca E. Stanchi

It was 0540 on 9 May at Fort Hunter Liggett, California, as a group of engineer Soldiers began their day. A convoy of three 2 1/2-ton trucks and a high-mobility, multipurpose wheeled vehicle (HMMWV) transported the Soldiers up the California hills to their work site. As they traveled up the dirt road, the morning sun began to shed light on the projects they were about to start for Operation Essayons. At their destination, the sides of the road were lined with heavy machinery, leading to a military container express (CONEX) with a sign on the side reading *721st Engineer Company*.

The Soldiers of the 721st Engineer Company (Horizontal Construction), United States Army Reserve, were responsible for the first step in the building process. After a road was constructed, the engineers began to level and compact the ground to create foundations. These foundations became sites where the vertical engineers could place buildings and CONEXes to create a cityscape for urban simulation training. The mission of the day was to continue working on improvised explosive device (IED) and vehicle-borne improvised explosive device (VBIED) lanes. These lanes would be set with contact points for training to defend against IEDs and VBIEDs. Building these lanes and foundations gave the horizontal engineers the opportunity to train in their respective fields in a controlled area.

Top right: A Soldier surveys the site for a future IED lane.

Above: Soldiers of the 721st Engineer Company bring in dirt from dig sites to use in the construction of an IED lane.

The project provided an environment where the Soldiers could be tested on a daily basis so they could become more proficient with equipment they had learned to operate in advanced individual training. Not only did the training environment help the engineers, but eventually Reserve units preparing for deployment will also benefit from the training. The city will provide an urban training site where commanders can assign missions to their Soldiers to teach them how to engage the enemy while focusing on tactics and strategies in simulated combat.

As the 721st missions came to a close, the Soldiers of the 668th Engineer Company (Vertical Construction) geared up for the next step in constructing the simulated urban landscape. Unlike horizontal construction, vertical construction builds structures from the ground up. The engineers of the 668th stepped in on 13 May to complete the building process. These Reserve Soldiers were responsible for building the superstructures and performing the masonry, electrical, and plumbing work that went into the site.

When the project is completed, it will be a forward operating base simulating a city in which our Soldiers may find themselves operating while deployed. This future training site will give a unit the team experience to walk into an unknown place, create something useful from nothing, and have an end product that will last for years to come.

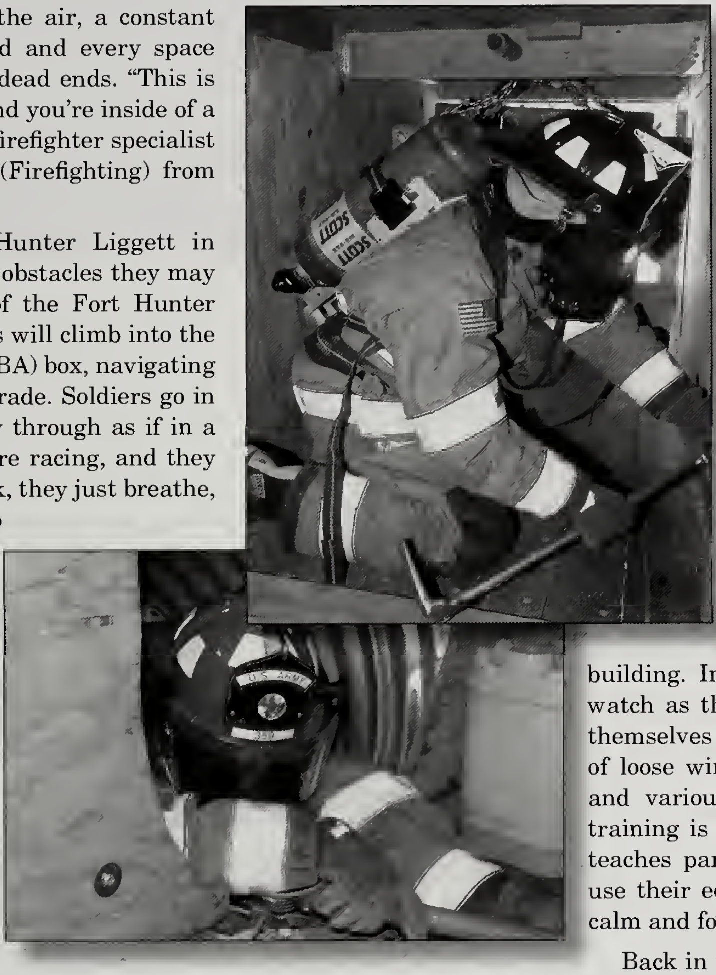
Specialist Stanchi is a journalist with the 372d Mobile Public Affairs Detachment, a United States Army Reserve unit in Nashville, Tennessee. She holds a bachelor's in mass communications and works in newspaper layout and design in Tennessee.

Panic Room

By Sergeant Shawn W. Napier

There is no light. . . Sirens fill the air, a constant reminder that oxygen is limited and every space is too small. All paths feel like dead ends. "This is the real deal. It's 90 degrees out here and you're inside of a blistering hot, metal container," said a firefighter specialist with the 482d Engineer Detachment (Firefighting) from Fort Riley, Kansas.

Firefighters come here, to Fort Hunter Liggett in California, to get a realistic feel for the obstacles they may face some day. Under the guidance of the Fort Hunter Liggett Fire Department, these Soldiers will climb into the self-contained breathing apparatus (SCBA) box, navigating a course to practice the skills of their trade. Soldiers go in with all their gear and work their way through as if in a maze. They're sweating, their hearts are racing, and they can barely breathe. When they get stuck, they just breathe, try to wiggle their way through, and do the best they can without panicking.


Center and Left: A U.S. Army Reserve Soldier/firefighter negotiates the SCBA at the Fort Hunter Liggett fire station.

But there is a trick—the firefighters must negotiate the course blindfolded to simulate heavy smoke conditions, crawling through spaces that are about as slim as they are. The military come here at least once every year, and 2009 has been the Fort Hunter Liggett Fire Department's biggest year with the Soldiers. Firefighter units from across the country have run through the SCBA box, and about six groups have gone through this year, each ranging from 15 to 30 firefighters at a time; two more groups went through in June.

With all the Soldiers fully geared, the firefighters of Fort Hunter Liggett begin blindfolding participants while checking their equipment. Participants need to have a good left-hand search pattern—relying on every other sense that they have, and definitely relying on a buddy. The two-story structure—sometimes having three tiers within it—helps the firefighters become familiar not only with their equipment but with their SCBA and how to use it in emergency situations when they're stuck.

One by one, pairs of Soldiers begin descending into a makeshift construction designed to simulate a collapsed building. Inside, instructors watch as the Soldiers guide themselves through a maze of loose wires, tight spaces, and various obstacles. The training is realistic, since it teaches participants how to use their equipment to stay calm and focused.

Back in the "panic room," several minutes have passed since the firefighters entered. Muffled yells pass from partner to partner as they attempt to help one another navigate the SCBA. Finally, the first pair crawls through the inverted tube that is the exit. Both of them stumble out, exhausted and disoriented. But they have just learned something that may help them save a life some day, perhaps their own.

Sergeant Napier is a military journalist with the 372d Public Affairs Detachment, a United States Army Reserve unit in Nashville, Tennessee. A former infantry Soldier, he served in Iraq and recently graduated from the Defense Information School basic journalist course at Fort Meade, Maryland.

Not only do individual units benefit from the Operation Essayons experiences—it is a win-win situation: Fort Hunter Liggett gets much-needed construction done, and units get to work on more than 60 realistic construction projects, doing the tasks associated with their military occupational specialties. Soldiers can take this experience and, with later exercises, become a part of engineering units that can perform their combat missions and their combat support mission at the same time.

Compact Fluorescent Lights, Mercury, and the Landfill

By Ms. Martha M. Miller

With the cost of energy today and the threat of continued cost increases, everyone is looking for ways to cut energy usage at home and in the workplace. There are many ways to do this without spending money, such as using daylight when possible and turning off lights, radios, televisions, and computers when they are not in use. Consumers can invest in Energy Star-certified products when purchasing new appliances and electronics. Another way to save energy is to replace incandescent lights with compact fluorescent lights (CFLs). CFLs and fluorescent lights are effective alternatives to incandescent bulbs for household, industrial, commercial, and military use in the United States and overseas during contingency operations. These lights have characteristics that are slightly annoying, such as not coming on immediately when their switch is hit; taking time to warm up to full brightness; and being adversely affected by cold temperatures, making them less acceptable for outdoor use. They also need to be properly disposed of at the end of their life cycle. The bulbs should not be thrown in the trash to end up in a landfill, but should be recycled. Aside from these issues, they can save money and electricity because they use approximately 75 percent less energy than equivalent incandescent bulbs. They also last up to 10 times longer and generate less heat when in use.

Risks From Mercury

The main concern is that CFLs contain mercury, which is a persistent, bioaccumulative neurotoxin harmful to the environment and to human health.

Environmental Risks. Most CFLs manufactured and sold today contain much less mercury than earlier versions. Manufacturers have tested individual lights according to the methodologies of the United States Environmental Protection Agency (USEPA) to ensure that the amount of mercury contained is low enough to be nontoxic and safe to go into a landfill. The manufacturer will even provide analytical documentation if requested. However, mercury does not break down in the environment and has a cumulative effect, building up until it reaches a toxic level. Mercury exists in several forms:

- *Elemental or Metallic.* Elemental mercury is a shiny, silver-white metal that is liquid at room temperature. This is the form used in thermometers, fluorescent lights, old thermostats, and some electrical switches. Elemental mercury evaporates at room temperature when exposed to the air and becomes an invisible, odorless, toxic vapor. People are particularly at risk of exposure to mercury vapor when a mercury-containing product breaks or a mercury leak occurs in a poorly ventilated area.
- *Inorganic.* Inorganic mercury compounds take the form of mercury salts and are generally white powder or crystals, with the exception of mercuric sulfide (cinnabar), which is red. These compounds have been included in products such as fungicides, antiseptics, and disinfectants, as well as some cosmetics and traditional medicines.
- *Organic.* Organic mercury compounds, such as methylmercury, are formed when mercury combines with carbon. Methylmercury is the most common form of mercury found in the environment.

A recent landmark study by the United States Geological Survey has achieved the first documentation of the process by which increased mercury emissions from human sources across the globe make their way into the ocean. Mercury is released into the atmosphere through—

- Burning of coal and hazardous waste.
- Producing chlorine.
- Breaking mercury-containing products.
- Leaking or spilling mercury.
- Treating and disposing of mercury-containing products and waste improperly.

It returns to the earth in raindrops, snow, dust, or simply due to gravity and eventually ends up in the world's water ecosystems. Mercury that contaminates the soil will also contaminate the groundwater and migrate into water ecosystems. Once it reaches the water, it is transformed by microscopic organisms into methylmercury, which is taken up by aquatic plants and animals that are then ingested by fish. The substance accumulates in the tissues of fish, and as larger fish eat smaller ones, bioaccumulation and biomagnification concentrate the methylmercury up the food chain.

Birds and animals that eat fish are more exposed to mercury than other animals in the water ecosystems. Similarly, animals that eat fish-eating animals will also be exposed. Ecologically, wildlife exposed to high levels of methylmercury experience reduced fertility, slower growth and development, abnormal behavior that affects survival, and death.

Human Health Risks. Can mercury cause harm to human health? Ask Mr. Jeremy Piven, a well-known actor who was forced last year to give up an important acting role due to mercury poisoning. According to his doctor, it was probably caused by a diet high in fish and Chinese herbal remedies. The consumption of contaminated fish and shellfish is the main source of methlymercury poisoning in humans. Fish is an important part of a healthful diet because it is a low-fat, reduced-calorie source of protein. Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. The greatest danger is for women of childbearing age, pregnant women, nursing mothers, and young children. The exposure of unborn and young children can harm the developing nervous system; has been linked to developmental disorders, learning disabilities, and cardiac dysfunction; and has been indicated as a possible link to autism. Based on human biological monitoring conducted by the Center for Disease Control and Prevention in 1999 and 2000, most people have blood mercury levels below the 5.8 micrograms per liter of whole blood which is associated with possible health effects. It was found that increased consumption of larger predatory fish, which contain higher levels of mercury contamination, causes higher levels of methylmercury in the bloodstream.

This information was used to develop the reference dose (RfD)—0.1 microgram per kilogram of body weight per day—used to determine acceptable exposure limits for women of childbearing years and those who are pregnant or nursing. In USEPA's 1997 Mercury Study Report to Congress, it was estimated that approximately 7 percent of women of childbearing age had a blood mercury level higher than the RfD. Blood mercury analyses completed from 1999 to 2000 during the National Health and Nutrition Examination Survey for women from 16 to 49 years of age showed that approximately 8 percent of women had levels higher than 5.8 micrograms per liter. Based on this information, it was estimated that more than 300,000 newborns were at risk due to *in utero* exposure to methlymercury.

Not all fish are contaminated with dangerous levels of mercury. In 2004, USEPA and the United States Food and Drug Administration (USFDA) issued the first fish consumption advisory to help guide consumers. It stated that there are health benefits from eating fish and shellfish low in mercury, such as shrimp, canned light tuna, salmon, pollock, and catfish. It also advised avoiding fish that are known to be contaminated at higher levels, such as shark, swordfish, tilefish, and king mackerel. USEPA also hosts a web-based compilation of fish advisories issued by states, tribes, territories, and local governments. USFDA provides several resources to assist consumers, such as <*www.FoodSafety.gov*> and 1-888-SAFEFOOD.

Although CFLs contain low levels of mercury, placing them in landfills just increases the amounts already being added from other sources, such as batteries, electrical switches, thermometers, and thermostats. Industrial, commercial, and federal/military facilities within the United States are required by law to properly handle and dispose of old fluorescent lights (generally black- or silver-tipped tubes) as hazardous waste, or accumulate and recycle them under the Universal Waste Rules because they contain mercury at a highly toxic level. With the introduction of the low-mercury fluorescent lights, those facilities also are throwing fluorescent lights in the garbage. Since mercury is a persistent substance with a cumulative effect, levels increase dramatically based solely on numbers. Elemental mercury vaporizes very easily, so it may be entering the atmosphere from broken mercury-containing items in landfills. Landfills are designed to reduce waste by adding anaerobic bacteria to increase the rate of decomposition. This suggests the possibility that inorganic mercury could also be converted to methylmercury in the landfill. If the landfill is not properly constructed, the different forms of mercury could leach into the soil, contaminate the groundwater, and make their way to water ecosystems.

CFLs vs. Incandescents

So is it better to use CFLs containing mercury or continue to use incandescent lights and avoid the posibility of increasing the level of mercury contamination that already exists? A CFL contains approximately 5 milligrams of mercury, an amount that would cover the tip of a ballpoint pen. It would take about 100 CFLs to equal the amount of mercury in an old thermometer. As stated earlier, burning coal to produce electricity is one of the contributing factors to mercury contamination and one of the benefits for using CFLs is a reduction in energy use. A 60-watt-equivalent CFL uses 13 to 15 watts of energy, a 75-watt-equivalent uses 18 to 25 watts, and a 100-watt-equivalent uses 23 to 30 watts. CFLs also last much longer and generate less heat, which can mean additional savings. It is estimated that if every American switched one incandescent light to a CFL, it would save more than $600 million in annual energy costs and reduce mercury emissions from burning coal.

The fact that CFLs use about 75 percent less energy is the biggest reason to support their use in contingency operations. Generators are the main source of energy for bases where grid power is not available, and generators require a fuel source to operate—normally diesel fuel or

JP-8. Some of the benefits of reduced energy use include—

- Cost savings from reduction of fuel for generators.
- Reduction of wear and tear on equipment.
- Reduction in man-hours to tend generators.
- Reduction of fuel used to bring in necessary resources from other locations.
- Reduction of man-hours required for transportation.
- Reduction in the exposure of our Soldiers to hazardous movement through enemy territory while transporting combustible materials.

Since CFLs last longer, fewer replacement lights must be purchased and stored.

The benefits must be weighed against the problems of managing CFLs once they are expended. Many countries where the U.S. military operates do not have environmental laws to provide guidance for the handling of hazardous waste. In those circumstances, as good environmental stewards, following U.S. regulations as closely as possible in each situation is a best management practice for the health and well-being of our Soldiers and the surrounding community and will save environmental cleanup money before redeployment.

A number of commercial establishments offer free CFL collection and recycling programs. If none are available in your area, request that the local waste hauler offer the service. Local municipalities may collect CFLs or have periodic collections. Utility companies in some states sponsor collection and recycling programs, and many household hazardous waste-collection centers accept CFLs. A list of these centers can be viewed at <*www.epa.gov/bulbrecycling*>. Sylvania <*http://www.sylvania.com/Recycle/CFLandHouseholdlightBulbrecycling/*> and <*http://www.lightbulbrecycling.com*> sell recycling kits of various sizes that come with prepaid return labels so they can be returned once they are full. Users on military installations should contact the facility recycling center for assistance. If there is no CFL recycling program in place for CFLs generated in the residential areas or for military/federal civilian personnel living off post, call the Installation Management Officer and request that one be started. Army bases are required by both federal and state laws—and Army regulations—to properly manage fluorescent lights. For this reason, there should be a program already in place that could be expanded to assist military/federal civilian personnel. These entities in the United States are also required to complete due diligence investigations on the waste haulers and disposal companies they use to dispose of or recycle hazardous waste to ensure compliance with all environmental laws.

The benefits of using CFLs in contingency operations must be weighed against the issues that arise with proper handling and disposal or recycling. Studies in Iraq and Afghanistan have shown that there are many issues that must be overcome or circumvented for the proper handling and disposal of hazardous waste. The lack of environmental laws, guidance, and recycling operations is the first. The fact that many countries surrounding the area of operations do not want hazardous waste transported through their territories to reach a place of export creates problems and increases the disposal costs. It is imperative that contractors be required to comply with sound environmental practices, that these practices be explicitly enumerated, and that due diligence be built into the contracts for vendors who will be handling hazardous waste. It is also imperative that follow-up, strict enforcement, and penalties be implemented to ensure that hazardous waste is handled according to the contracts. Containers such as those provided by Sylvania can temporarily store CFLs safely and may provide a disposal option through the U.S. Postal Service even during contingency operations.

For more information about mercury, CFLs, and the Universal Waste Rules, go to <*http://www.epa.gov*>. For information about cleaning up a broken CFL or mercury spill, go to <*http://www.epa.gov/mercury/spills/index.htm*>.

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CONSOLIDATION OF MOS 21E AND MOS 21J

By Mr. Ronnie King

Many personnel have contacted the United States Army Engineer School, Fort Leonard Wood, Missouri, for clarification of the intent, regulation, or policy on the consolidation of military occupational specialty (MOS) 21E construction equipment operator and MOS 21J general construction equipment operator. The Notification of Future Change on the consolidation of the two MOSs pointed out that all personnel who had been awarded those specialties before the effective date of the consolidation would have a Y2 identifier (signifying transition to a new MOS that requires supervised on-the-job training [OJT]) placed in the Human Resources Command databases for the Regular Army and Reserve Component until units provided documentation of cross-training requirements on their Soldiers.

The Engineer School Director of Training and Leader Development (DOTLD) has provided cross-training guidance for the Engineer Regiment. The Individual Training Division created a booklet of personnel assessment sheets (PAS) that provide guidance on which tasks must be trained or for which tasks evidence of performance of, or knowledge about, the task must be provided. Once completed, Department of the Army (DA) Form 4187 (Personnel Action) should be submitted to the appropriate personnel agency for deletion of the Y2 identifier. The PAS booklet contains a sample form with routing instructions for each component.

The PAS booklets are divided into two volumes. Volume I was designed for 21J Soldiers who require training on 21E skills. Volume II is designed for 21E Soldiers who require training on 21J skills. The tasks listed in the booklets are the same tasks a Soldier would be trained on during advanced individual training or an MOS reclassification course. The difference is that either the unit is providing the training or the Soldier has already acquired the skills through OJT. A senior member in the Soldier's chain of command signs off to verify qualification on each task after the Soldier has demonstrated proficiency at it.

Volume I provides a breakout of tasks on the scoop loader, motorized scraper, and crawler tractor, while Volume II lists tasks on the hydraulic excavator, the small emplacement excavator (SEE), and the backhoe loader (BHL). Fielding of the BHL, an Army replacement for the SEE, began in 2008. Some units have received the BHL, and some still have the SEE. Soldiers and units are not expected to train on both pieces of equipment. Tasks performed on the SEE are transferable to the BHL and a waiver of tasks is not required.

The PAS booklets do not cover all of the critical tasks in the 21E MOS skill set, but only those that are designated as "institutionally trained." The booklets are not intended to award an MOS to Soldiers but to outline the skills required to apply for removal of the Y2 identifier. Neither are the booklets meant as a replacement tool for reclassification through OJT. A residential, institutional version of the course at either a Regular Army location such as Fort Leonard Wood or a Reserve Component Regional Training Institution is still required for reclassification.

Units must still provide training on the full 21E skill set. Brigadier General Bryan G. Watson, Engineer School Commandant, recently signed a new critical task list for MOS 21E. The task list is available at Army Knowledge Online (AKO). Portable document format (PDF) copies of the PAS booklets can be found by logging on to AKO and typing *PAS books* into the Search box.

PAS booklets have been a good tool for field commanders who need guidance on skill set requirements for cross-training and Y2 identifier removal. They have also become a good foundation for measuring the beginning of technical competence. There has been discussion at the Engineer School about the design and structure of a booklet to outline and measure the technical competence of Soldiers. In line with the "Building Great Engineers" campaign of Major General Gregg F. Martin, Commanding General, United States Army Maneuver Support Center of Excellence (COE), the Engineer Regiment needs a tool to outline, track, and measure the MOS qualification levels of its Soldiers. The construction of a technical competency assessment booklet for each MOS would provide units and field commanders with a way to track the progress of Soldiers and assess their promotion potential. Guidance on this matter, if approved, will come out in future issues of *Engineer* and the *Engineer Blast*.

Mr. King is a training specialist with the Capability Development and Integration Directorate, MANSCEN, Fort Leonard Wood, Missouri.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Jan 04	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Published.
Organizational Manuals			
FM 3-34.22 (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations –Brigade Combat Team and Below*	Pending (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual will encompass engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker—the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** Published February 2009. To be consolidated into FM 3-34 in 4QFY10.
FM 3-34.23 (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15, and FM 5-116. **Status:** To be published in 4QFY09. To be consolidated into FM 3-34 in 4QFY10.
Combat Engineering			
FM 3-90.11 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The United States Marine Corps (USMC) plans to adopt this manual as well. **Status:** To be published in 4QFY10.
FM 3-90.13 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Pending (Sept 94) (Mar 85)	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE) and full spectrum operations, along with emerging doctrine on networked munitions. **Status:** On hold for release of FM 3-90, *Tactics*.
FM 3-34.300 (FM 5-103)	*Survivability*	Jun 85	This manual provides survivability information needed by commanders and staffs at the tactical level. It includes guidance on integrating survivability into planning and orders production and creation of the engineer running estimate. It provides examples of a survivability capabilities card, matrix, and timeline to assist with the planning, revision, and conduct of specific survivability tasks. The USMC plans to adopt this manual as well. **Status:** On hold; no rewrite date projected.
FM 3-34.400 (FM 5-104)	*General Engineering*	Nov 86	This manual describes the operational environment (OE) and how to apply and integrate general engineering principles in support of full spectrum operations. It focuses on the establishment and maintenance of lines of communication and engineer support to sustainment operations throughout the area of operations. Although not designated as a multi-Service publication, it is intended to inform all Service components of the types of general engineering tasks, planning considerations, the variety of units available to perform them, and the capabilities of Army engineers to accomplish them. The USMC designation will be added to this manual. **Status:** Published 9 December 2008.

Engineer Doctrine Update

U.S. Army Maneuver Support Center
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

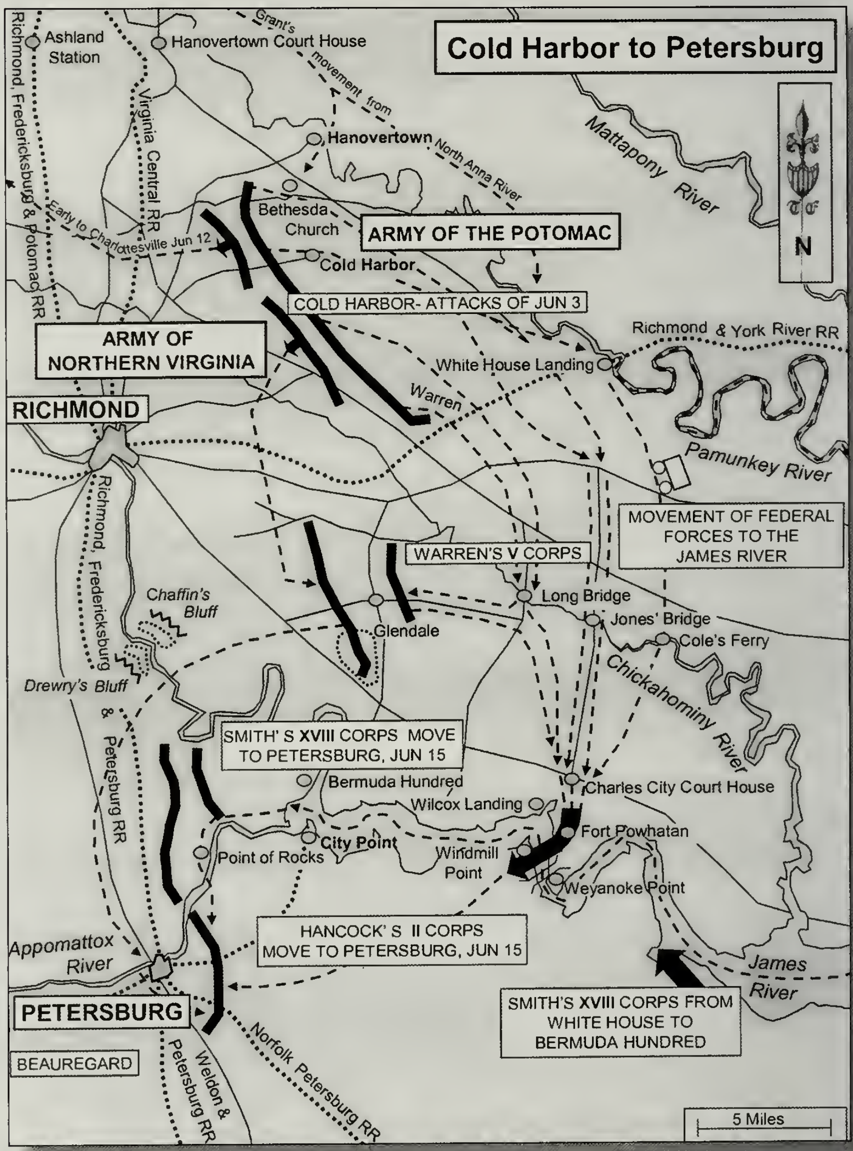
Publication Number	Title	Date	Description (and Current Status)
General Engineering			
FM 3-34.410 Volumes I & II (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations (TO) in the design of roads, airfields, and helipads. It is currently dual-designated with the Air Force. The Air Force (as well as the Navy and USMC) plans to adopt the new manual also. **Status:** Pending completion of drainage chapter.
FM 3-34.451 (FM 5-472)	*Materials Testing*	Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The USMC plans to adopt this manual as well. **Status:** Preparing final approved draft: to be published in 1QFY10.
FM 3-34.465 (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. **Status:** Preparing Volume II. Initial draft staffing of both volumes in 1QFY10.
FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and USMC includes the newest technologies, current practices, and revised formulas. **Status:** Estimated date for posting to Army Knowledge Online (AKO) is 4QFY09.
FM 3-34.485 (FM 5-415)	*Firefighting Operations*	Feb 99	This manual gives directions on deploying and using engineer firefighting teams. These teams provide fire prevention/protection, aircraft crash/rescue, natural cover, and hazardous material (HAZMAT) (incident) responses within a TO. This is a parallel effort with the revision of the firefighting Army regulation (AR) to bring both policy and doctrine current with required certifications, newest technologies, and current practices. **Status:** Initiating the program directive and developing the initial draft.
FM 3-34.500 (FM 3-100.4)	*Environmental Considerations in Military Operations*	Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** Estimated date for posting to AKO is 4QFY09.
Geospatial Engineering			
FM 3-34.600 (FM 3-34-230)	*Geospatial Operations*	3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Estimated date for posting to AKO is 1QFY10.

NOTEs: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 24 November 2009.

Crossing the James River, June 1864
"...the real crisis of the war"

By Mr. Gustav J. Person

The Overland Campaign began on 4 May 1864. What followed were 45 days of continuous marching, fighting and digging. It was the fourth year of the Civil War, and Lieutenant General Ulysses S. Grant had been brought east to command all the Union armies and end the war. He had planned a coordinated series of simultaneous offensives to deny the Confederates the ability to redistribute their forces to meet these attacks. Grant knew that Virginia would continue to be the main theater of the war, and he chose to make his headquarters in the field with the Army of the Potomac, commanded by Major General George G. Meade. Facing that force would be General Robert E. Lee and the Confederate Army of Northern Virginia.



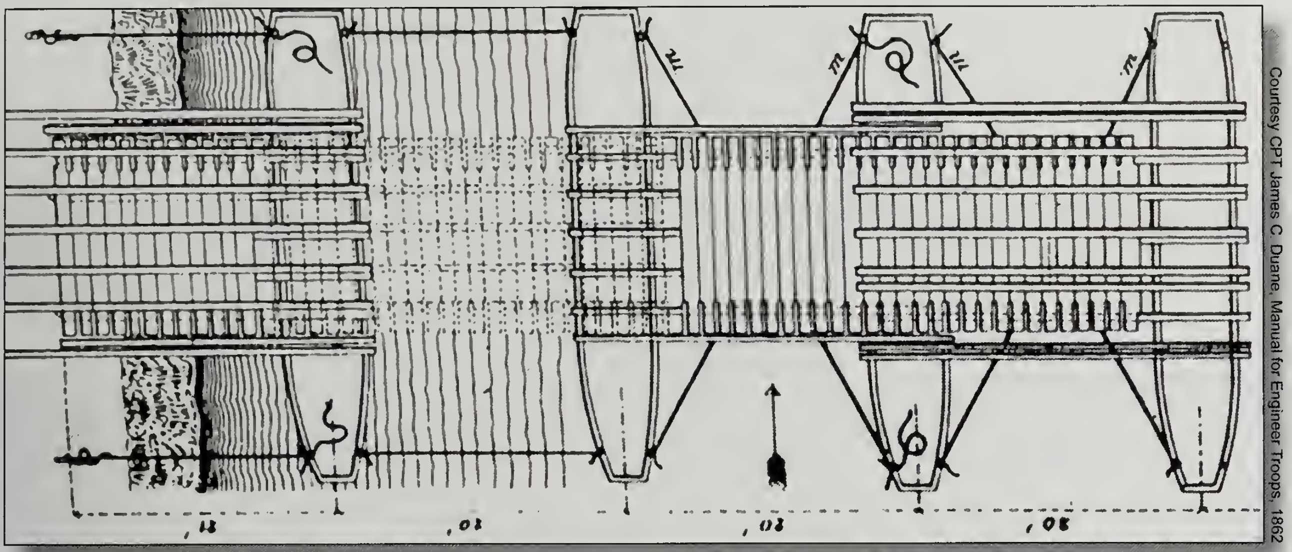
Map courtesy MSG Paul Jenkins, USA (Ret.)

Map of Cold Harbor to Petersburg

Grant's New Target: Petersburg

Up until then, the war in the Eastern Theater had not gone well for the Union, and Grant had faced strong opposition and heavy casualties as the Army of the Potomac fought its way south from the area around Fredericksburg toward Richmond. Sidestepping Lee's army repeatedly, both armies came to rest at Cold Harbor, just eight miles east of the Confederate capital. A stalemate ensued as the opposing armies dug in extensively after the failure of the Federal assaults on the morning of 3 June. The armies would remain in place under hot, fetid conditions for the next 9 days. The Confederates had faced difficult situations before, but Brigadier General E. Porter Alexander proclaimed this as the "real crisis of the war."[1] Grant now determined to change his strategy. His new target would be the Confederate commercial and transportation hub at Petersburg, 20 miles south of Richmond along the Appomattox River. By capturing Petersburg, Grant could easily starve the Southerners out of their defenses around Richmond, which would allow him to defeat them on open ground of his own choosing. To do that, he would have to steal a march on the Confederates, cross the James River undetected to the south, and capture Petersburg by a *coup de main* before the Confederates could react.[2]

Grant devised a complex, masterful plan that involved joint and combined actions and the operations of an army group—including the Army of the Potomac and the Army of



Courtesy CPT James C. Duane, Manual for Engineer Troops, 1862

Diagram of the construction of a ponton bridge

the James under Major General Benjamin Butler, and the Union Army engineers would play a vital role. The Engineer Brigade of the Army of the Potomac had already performed Herculean tasks since the beginning of the campaign. They had erected 38 ponton bridges with an aggregate length of 6,458 feet. Major Nathaniel Michler, acting chief engineer of the Army of the Potomac, later remarked that "the facility, ease and promptness with which a thoroughly trained body of engineer troops can accomplish such important duties, also bear testimony to the zeal, energy, and ability displayed by both officers and men, and to the important services rendered by this arm of the service, not only during the weary marches of a long and trying campaign, but also in the preparation and execution of the more tedious [later] operations of the siege [of Petersburg]."[3]

Benham's Brigade

General Meade had an efficient force of engineer troops, including Captain George H. Mendell's United States Engineer Battalion, consisting of 4 companies. Brigadier General Henry W. Benham's Volunteer Engineer Brigade, like the regular battalion, had served with the Army of the Potomac since late 1861. It was a seasoned unit of volunteers, originally consisting of the 15th and 50th New York Volunteer Engineer Regiments. Soon after Chancellorsville in May 1863, most of the 15th New York were mustered out of service after their 2-year enlistments expired. Its few remaining companies, composed of 3-year enlistees, were detailed to behind-the-lines duty, but the 50th New York, now commanded by Lieutenant Colonel Ira Spaulding, remained with the Army of

Photo, by Timothy O'Sullivan, courtesy Library of Congress

Camp of the 50th New York Volunteer Engineer Regiment at Rappahannock Station, Winter 1864. The ponton bridge train is at left.

Photo by Brady & Co., courtesy Library of Congress

Ponton bridge over the James River at Weyanoke Point

the Potomac throughout the war. The 50th consisted of 11 companies, divided into 4 battalions, with 40 officers and 1,500 enlisted men. During the Overland Campaign, the battalions had been parceled out to support the different corps of Meade's army. Benham and most of the 15th were at the Engineer Depot in Washington, D.C., at the beginning of the Overland Campaign. He transferred the 15th and his headquarters to Fortress Monroe when that place became the forward engineer base for Grant's operations in late May. General Butler's own Army of the James engineer troops consisted of 8 companies of the 1st New York Volunteer Engineer Regiment, commanded by Colonel Edward W. Serrell.[4]

On the afternoon of 6 June, Grant dispatched two of his *aides-de-camp*, Lieutenant Colonels Cyrus Comstock and Horace Porter, on a dual mission to the south. He sent them first to Bermuda Hundred to confer with General Butler and apprise him of the impending operation. Butler's Army of the James had moved up the James River from Fortress Monroe on 4–5 May and was now firmly entrenched in the peninsula bordered by the James and Appomattox Rivers.

In late May, Major General William F. "Baldy" Smith's XVIII Army Corps of the Army of the James had been detached to reenforce the Army of the Potomac and was currently entrenched in the Union line at Cold Harbor. Grant intended to embark that corps at White House Landing on the Pamunkey River, have it steam 150 miles around the James peninsula, and lead the attack on Petersburg from Bermuda Hundred. Smith would cooperate with the II Army Corps, which would cross the James farther downstream. Comstock and Porter were then to select the best crossing point on the river for the ponton bridge site, taking into consideration the necessity of choosing a place "which will give the Army of the Potomac as short a line of march as practicable, and which at the same time be far enough downstream to allow for a sufficient distance between it and the present position of Lee's army to prevent the chances of our being attacked successfully while in the act of crossing."[5] The pair returned to Grant's headquarters on 12 June, noting that the principal advantage of the selected point near Fort Powhatan was that "it was the narrowest point that could be found on the river below City Point."[6]

Grant had foreseen the possibility of crossing the James as early as 15 April, when he ordered General Benham to gather and hold at Fortress Monroe sufficient water transport to tow necessary quantities of bridge-building materials to span the James. At 0900 on 13 June, the Union Army would begin to disengage from the defenses behind Cold Harbor. Grant's careful planning had already paid dividends when he ordered the ponton boats upriver around noon on 4 June. One hundred and fifty-five ponton boats with their attendant bridging equipment had quickly gone to Bermuda Hundred, and the additional battalion bridge trains from the 50th New York were ordered south.[7]

Four Coordinated Columns

Meade's talented chief-of-staff, Major General Andrew A. Humphreys, late of the Corps of Topographical Engineers, was directed to draft the operations order. In broad outline, Humphreys detailed that the Army of the Potomac would evacuate Cold Harbor in four coordinated columns. The operation was to begin with V and II Army Corps crossing the Chickahominy River at Long Bridge. Engineers of the 50th New York were detailed to build a 1,200-foot-long ponton bridge across this watercourse, requiring extensive use of corduroy approaches because of the surrounding swampy terrain. Once over, V Corps turned west to the 1862 battlefield at Glendale to provide a screening and blocking force and to create the impression that Grant intended to launch an offensive north of the James toward Richmond. Once in place, V Corps occupied a 5-mile defensive position from the White Oak Swamp to Malvern Hill. The 3d Cavalry Division of Major General Philip Sheridan's Cavalry Corps reenforced Major General Gouverneur Warren's V Corps for this mission. Simultaneously, VI and IX Army Corps were to follow separate routes to Jones' Bridge on the Chickahominy east of Warren and continue on to Charles City Court House. A third column, made up of the army's trains and accompanied by Brigadier General Edward Ferrero's division of United States Colored Troops as a guard force, was to cross the Chickahominy east of Jones' Bridge and pursue a more remote network to the James. Ultimately, the trains crossed at Cole's Ferry on the Chickahominy, but were delayed at least 30 hours by the shortage of bridging material. While the first three columns funneled south toward Charles City Court House, Smith's fourth column marched to White House Landing to embark for Bermuda Hundred. If all went according to plan, two days of maneuver should see Smith arriving at Bermuda Hundred and the Army of the Potomac crossing the James on a combination of ferry and ponton bridging—and marching on Petersburg unopposed.[8]

In its four years of existence, the Army of the Potomac made many mistakes and often paid a high price; yet the army was always able to conduct a withdrawal under enemy contact without any interference. So it was at Cold Harbor as Warren's corps, on the extreme right flank, disengaged and moved back to assembly areas behind the lines on the night of 11 June. The remainder of the army moved back shortly after dusk on the following day, filling a 7-mile-long fortification that had been hastily built by 1,720 men of VI Corps and the United States Engineer Battalion.

Detailed Reconnaissance

On 12 June, Brigadier General Godfrey Weitzel, chief engineer of the Army of the James, directed his assistant, Lieutenant Peter S. Michie, CE (United States Military Academy, Class of 1863), to make a detailed reconnaissance of the river-crossing areas in the vicinity of Fort Powhatan. His report examined three locations and concentrated on Wilcox Landing for a ferry site, 3/4 of a mile upstream from Fort Powhatan, and Weyanoke Point for the bridge site, 3 miles downstream. The width of the river at the latter point spanned 1,992 feet. The landward approaches would require considerable clearage of trees and an extensive trestle ramp. The James River was a navigable tidal stream for 108.8 miles from its mouth to Richmond. At Weyanoke Point, the narrow river channel averaged 85 to 90 feet (about 15 fathoms) deep, and the swift tidal river rose and receded 3 to 4 feet each day. Meanwhile, Major Michler was directed by headquarters, Army of the Potomac, to select a line to be occupied as an entrenched bridgehead position covering the crossing sites. By the evening of 14 June, the entire army—less the army trains and the cavalry—had arrived within the bridgehead. On the following day, Michler also selected a shorter line to be entrenched below Queen's Creek as the line contracted.[9]

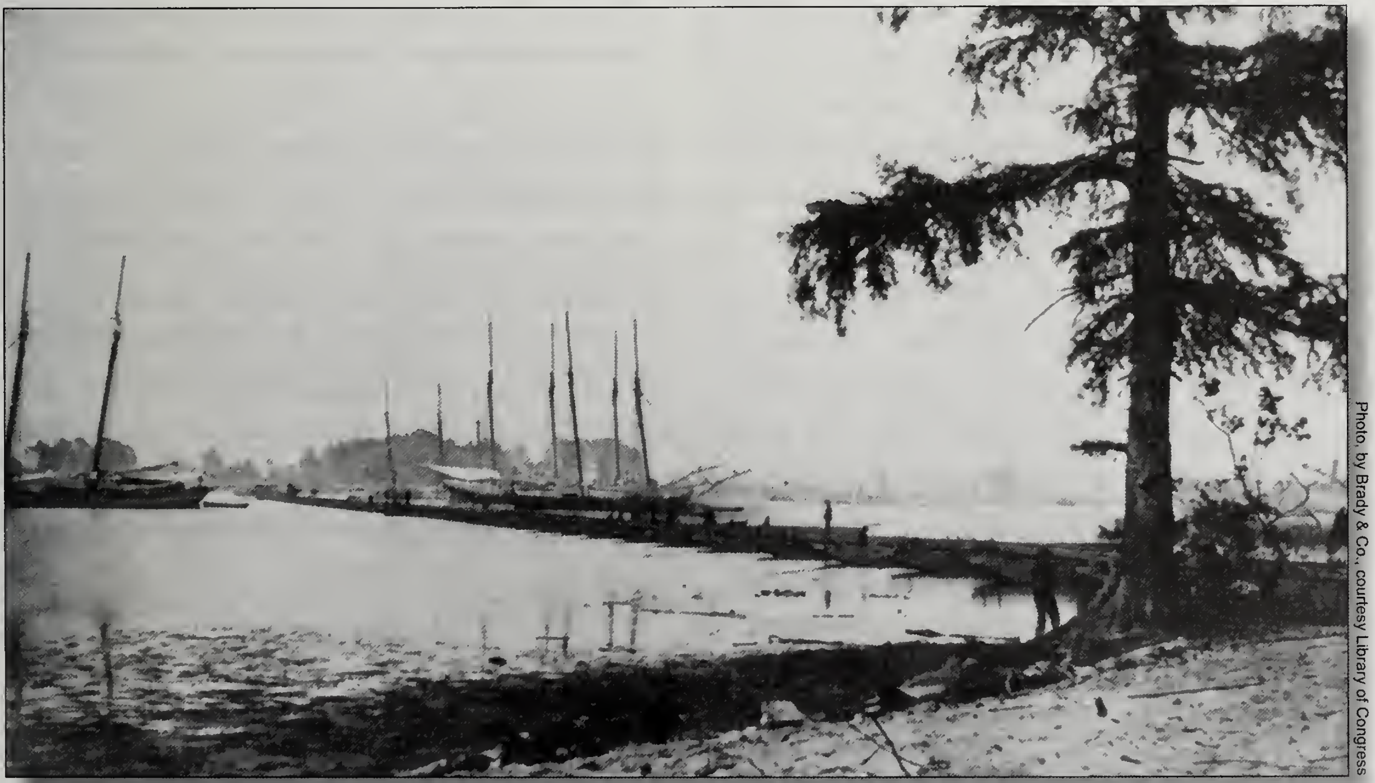


Photo by Brady & Co., courtesy Library of Congress

Ponton bridge over the James River from the South Shore

Photo courtesy Library of Congress

Ponton bridge at Jones' Bridge over the Chickahominy River

Robert E. Lee's problem lay not in being surprised by Grant's move, but in being unsure as to its ultimate objective. General P.G.T. Beauregard, commanding the Department of North Carolina and Southern Virginia at Petersburg, had suggested as early as 7 June that Grant would likely cross the James and strike Richmond from Bermuda Hundred. Lee seriously considered the possibility that Grant would cross the Chickahominy, but remain north of the James and advance toward Richmond in conjunction with Butler on the south side of the river.[10]

Scene of Confusion

On 12 June, the United States Engineer Battalion moved out in full marching order at 1500. They crossed the Chickahominy about 24 hours later on the ponton bridge at Jones' Bridge laid by the 50th New York. On the far side, they awaited the passage of VI Corps and then marched to Charles City Court House where camp was made. Replacement uniforms and rations were issued. On 14 June, the battalion moved out around 1100 and 3 hours later went into bivouac at Weyanoke Point. At 1500, the men fell in without arms and proceeded a short distance down the bank. Brigadier General Weitzel was there with several companies of the 1st New York. The area was a scene of confusion, and nothing had been done toward erection of the bridge. As noted previously, the ponton material had been transported to Bermuda Hundred in early June—and then, inexplicably, moved back to Fortress Monroe on 12 June. It would take another 24 hours to reposition all that equipment at Weyanoke Point. Not to be delayed further, the detachment of 200 U.S. engineers, at the word of command and led by its noncommissioned officers, sprang into the slimy, muddy water (which was almost up to the neck) and succeeded in building—in 1 hour—an abutment of trestle work some 150 feet long through the soft marshes, reaching into the deep water proper—arguably the hardest part of the entire project. The battalion was then transferred to work on the opposite shore, with volunteer engineers taking up the work at Weyanoke Point. General Benham had arrived around noon from Fortress Monroe with portions of the 15th New York and a number of vessels with the bridge materials in tow. He was soon joined by an additional detachment of 220 men and a bridge train of the 50th New York, preceding the army. Major James C. Duane, chief engineer of the Army of the Potomac, turned over the completion of the bridge to Benham. As fast as the materials could be unloaded from the vessels, they were made into "rafts" of six ponton boats and rowed into position in the bridge. The bridge was built simultaneously from both shores by successive rafts, a process well described in Major Duane's *Manual for Engineer Troops*, published in 1862.[11]

French Army Equipment and Doctrine Adopted

During the 1850s and 1860s, the French army was considered by many of the world's armies as the epitome of efficiency, innovation, and success. Operations in North Africa, the Crimea, Northern Italy, and Mexico were widely studied, and behind all that was the ghost of the great Napoleon, a military leader to be emulated. Much of the French army equipment and doctrine was copied by the United States Army, and especially military engineering. The army soon adopted the French bridge train and the heavy wooden ponton boats, the latter each weighing 1,600 pounds. The weight and bulk of the boats were necessary to provide the buoyancy necessary to support large bodies of troops and heavy wheeled vehicles. The boats and transport wagons were strong enough for use under the harshest conditions. The equipment was so serviceable that it would remain, with remarkably little change, as the standard for the army until the First World War.[12]

Not to be delayed by the erection of the bridge, most of the infantry of three corps (II, V, and VI) began ferrying across the James at Wilcox Landing on the morning of 14 June. Major Wesley Brainerd and his battalion of the 50th New York (Companies B, F, and G) had already arrived to repair the wharves there. Later that evening, he was ordered directly across the river to Windmill Point to construct an additional wharf for the use of the follow-on troops. Federal officers had gathered a varied flotilla of steamers and ferries to carry the huge army. The 141st Pennsylvania Volunteer Infantry Regiment of the II Corps crossed from Wilcox Landing on the *Thomas Powell*, a steamer that normally cruised the less-troubled waters of the Hudson River. The ferrying operation consumed about 62 hours and required 12 hours to ferry the infantry of each corps. If available, the same troops might have marched over the bridge in not more than one-fourth the time. About noon, or shortly after the corps began to cross, the steamers carrying the XVIII Corps began to pass Windmill Point, en route to rejoin the Army of the James. Major General "Baldy" Smith, commanding the corps, was aboard the leading steamer. Thus, the troops marching overland and those moved by water met simultaneously at the same place on the James River.[13]

The engineers began assembling the ponton bridge around 1600 on 14 June, after a further delay to allow the river passage of the XVIII Corps past Weyanoke Point. The bridge, completed seven hours later, was 2,170 feet long and used 101 ponton boats. It was constructed with "normal intervals" providing 20-feet spans—center-to-center of boats. Planking called *chess*, laid across balks (stringers), provided a roadway 11 feet wide between guardrails. To permit the passage of vessels upstream and downstream as required, a draw 100 feet wide was incorporated in the bridge in the river channel. This draw, constructed of ponton rafts, could be disengaged and floated out with the current to open the draw. To anchor the bridge in the swift current, three schooners were positioned abreast above the bridge and three below the bridge, under the direction of General Weitzel.[14]

Joint Operation

A notable aspect of the operation was its jointness. Some Confederate gunboats still patrolled the river near Richmond. Besides providing a security force, the United States Navy, under Acting Rear Admiral Samuel P. Lee, was ordered to sink four schooners, moored with chains fore and aft in the main channel, and one in the narrower channel in the river, 800 yards above Aiken's Landing toward Richmond, to prevent hostile gunboats from attempting to steam downstream past the Union naval vessels.[15]

At the time of the crossing, Grant estimated the combined strength of the Armies of the Potomac and the James at about 115,000, even though half of the artillery was sent back to Washington, and many men were discharged by expiration of their term of service. Although General Meade ordered IX Corps to begin crossing immediately, the first troops did not start crossing the bridge until 0600 on 15 June—yet the bridge was fully operational at 0100. Meade directed Benham to provide overall supervision of the crossing. Except for five hours on 15 June, from 0600 that day until 0930 on 17 June, the bridge was in constant use—a total of 46 hours. The personnel, animals, and vehicles of the army crossed without incident, as follows: IX Corps troops and trains; XVIII Corps trains, artillery and an infantry brigade as train guard; an artillery brigade of VI Corps; army trains; V Corps trains and artillery; army headquarters; 2d Division, VI Corps; VI Corps trains and artillery; 3d Cavalry Division; remainder of the army trains; and finally, 4th Division, IX Corps. The army trains, including several thousand wagons and a herd of 2,000 to 3,000 cattle, required at least 31 hours to cross and were about 50 miles in total length.[16]

A Noble River

The crossing greatly uplifted the morale and spirits of the men who were out of the horrid trenches at Cold Harbor, and weary from the hot, dusty march from the Chickahominy. They were able to enjoy the beautiful green vistas along the river. Lieutenant Colonel Theodore Lyman of Meade's staff asserted that "to appreciate such a sight you must pass five weeks in an almost unbroken wilderness, with no sights but weary, dusty troops, endless wagon trains, convoys of poor wounded men, and hot, uncomfortable camps. Here was a noble river...."[17] As the 7th Rhode Island Volunteer Infantry Regiment reached the James, its brigade band serenaded them with "Ain't I Glad to Get Out of the Wilderness."[18] The band had dramatically summed up the feelings of the army.

The V Corps chief of artillery, Colonel Charles Wainwright, was equally impressed with the bridge. It was "really a wonderful piece of pontooning [sic], equal I suspect to anything of the sort ever done before." He found it to be "very steady in crossing, nor has there been the slightest trouble as far as I can learn."[19]

During these critical days, an anxious Beauregard continued to press Lee and the Richmond government for additional troops, citing the large-scale movements on the river and his own troop shortages. Meanwhile, with all the troops safely across the river, the bridge was disassembled on 17 June, and its components towed upriver to Bermuda Hundred and City Point. It still reputedly holds the world's record as the longest temporary military bridge in modern history, and the contribution of the engineers was a credit to them and the army.

Overwhelming Advantage

While the river crossing is regarded as brilliantly conceived and almost flawlessly executed, the full story in those hectic days of mid-June was not over. Grant's planning had enabled "Baldy" Smith to reach Petersburg with an overwhelming advantage in numbers. His 14,000 men opposed a mere 2,200 Confederates, who were supported by about 2,000 militiamen in the so-called Dimmock Line. The bulk of Lee's army was still miles away on their march from Cold Harbor. After crossing the Appomattox River from Bermuda Hundred on a ponton bridge at Point of Rocks, Smith concentrated his force at City Point and then approached Petersburg, receiving artillery fire from the Dimmock Line in midafternoon on 15 June. After a prolonged reconnaissance, his attack finally went in at 1900 and cracked open a mile of the Dimmock Line with astonishing ease. At least eight Confederate battery positions fell to the Federal assault. Almost inexplicably, he stopped, although Petersburg lay wide open before him. Major General Winfield S. Hancock's II Army Corps had crossed by ferry the previous day. He had been ordered to support Smith, but was delayed by confusing orders, a lack of guides and adequate maps, and the need to draw rations. By then, darkness had fallen, and the arrival of Major General Robert F. Hoke's division of 5,000 men from the Army of Northern Virginia sealed the breach. It had been a close-run thing indeed, and the siege of Petersburg would now go on for another 9 months.[20]

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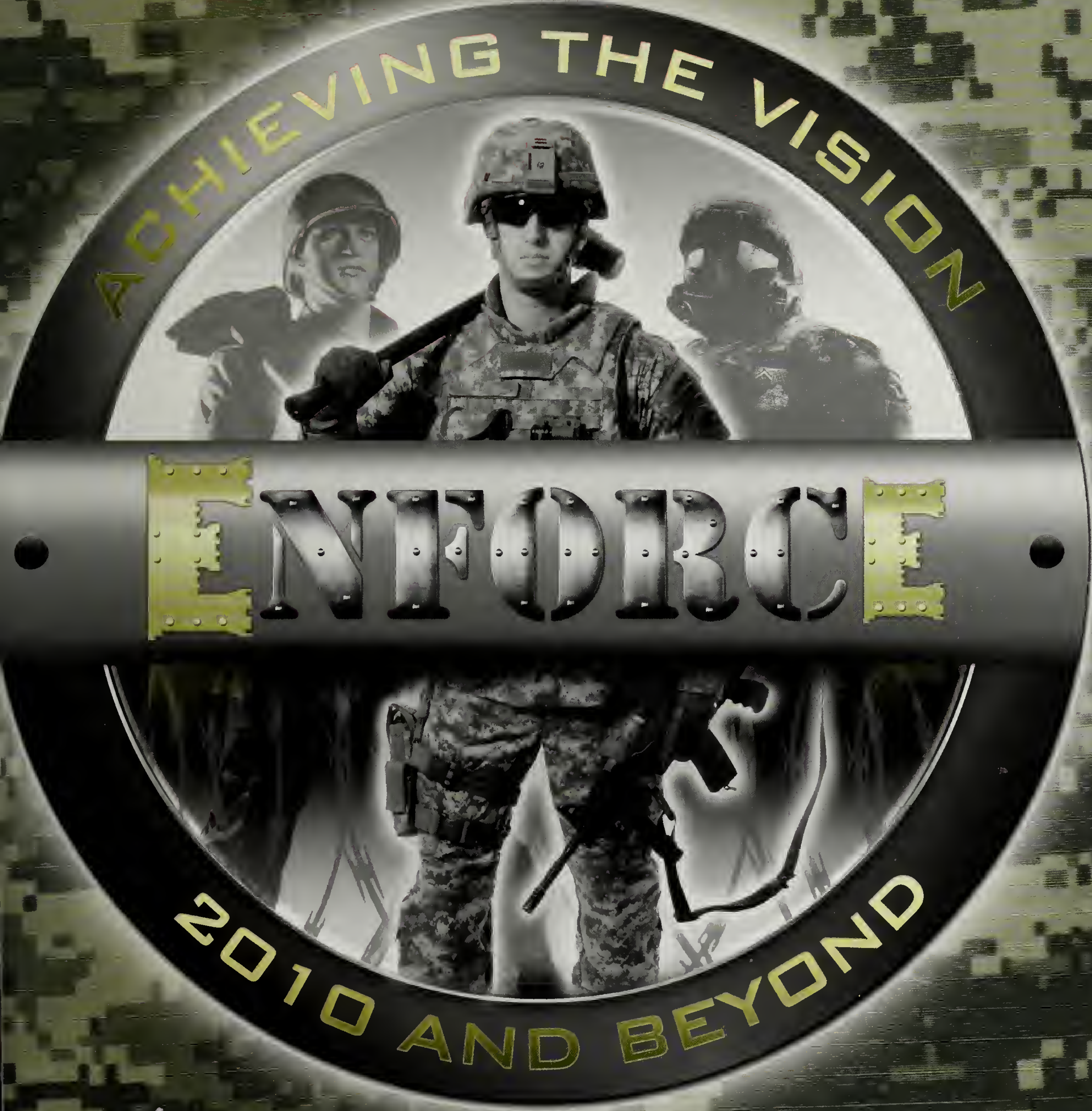

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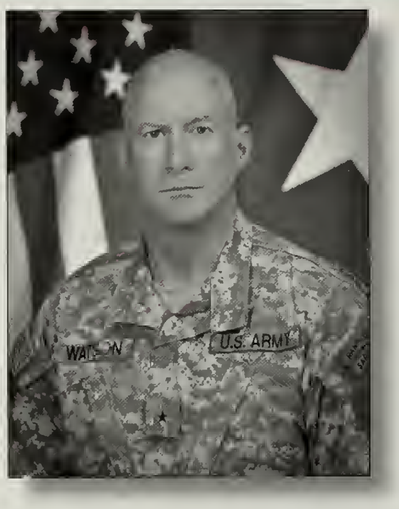
Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School

ENFORCE 2010 – Three Major Themes

More than any time in our history, today our Engineer Regiment is composed of a great depth of combat experience, a wide breadth of applied engineering savvy, and an incredible force of innovative Soldiers—particularly our young leaders. Equally historic, today's engineer operations around the world—from Iraq and Afghanistan to Haiti, and from Korea to the Horn of Africa—require greater partnering of engineers across nations and Services. Further, we are at a pivotal time in our history as a Regiment—solidifying the enduring lessons learned from nine years of combat and applying them to the challenges we face in the next decade of persistent conflict.



As such, there are three major themes for this year's ENFORCE. Allow me to elaborate on these themes and highlight a few key events:

Theme #1 – Gaining Sage Wisdom From Our Young Leaders. One of the features of this year's ENFORCE is an emphasis on giving young leaders a louder voice and getting their advice and counsel on the future. For example, our Warfighter Forum will consist of young officers, warrants, and NCOs who have served at platoon, company, and battalion level—telling senior leaders, and others, their views—from lessons learned to what future capabilities are needed. Our Industry Forum will follow suit, allowing junior leaders to tell our partners in industry what equipment works, what doesn't, and what they need to prosecute the fight. We will also have two keynote speakers—one senior leader and one junior leader—each bringing personal experience, insight, and perspective to our discussion of the future. In keeping with this theme, I've asked brigade and battalion commanders across all components to send junior leaders to ENFORCE—officers, warrants, and NCOs—to participate and take back to their units their view of where the Regiment is going.

Theme #2 – Expanding Engineer Partnerships as a Forethought. This year we will cast a wide net for international and sister Service engineer participation in order to openly discuss and collaborate on the challenges we must face together…as a community of engineers. Nearly all forums and workgroups will be inclusive rather than exclusive for our international engineers, both in content and classification. We will build on our strong partnership with the engineers of our sister Services, exploring ways to advance our integration and complementary interdependence. Seminar venues will allow all of our partners the opportunity to discuss their view of the challenges in specific regions.

Theme #3 – Checking Our Campaign Plan Azimuth and Pace Count. At last year's ENFORCE, we laid out the foundation of a campaign plan for the future that was the subject of debate among senior leaders. The Regimental Headquarters and School have worked hard to put some meat on the vision we established. I will provide the Regiment an update on the campaign plan, and we will use the breakout sessions—attended by the full range of conference participants—to confirm, deny, or adjust our decisive points to ensure that we remain a Regiment that is able to meet the Army's demands.

Continuing to Build Great Engineers. Our experience in nine years of combat has reinforced—again—that Army engineers must be warriors always…and technically proficient in applied engineering. When the commander calls, we must have the skills necessary to solve his problems and the warrior ethos necessary to deliver results on the battlefield…under the toughest conditions. ENFORCE will provide a number of professional development seminars designed to discuss some of the latest construction management techniques and best practices, provide attendees with updates on the latest TTP used in-theater as part of the C-IED fight, get a refresher in geospatial engineering, and many other subjects. Some seminars will even offer the opportunity for professional accreditation. All the while, we will gather as a tribe to celebrate our honored heritage and pay tribute to some among our ranks whose service epitomizes our calling to solve the commander's problems and serve with excellence.

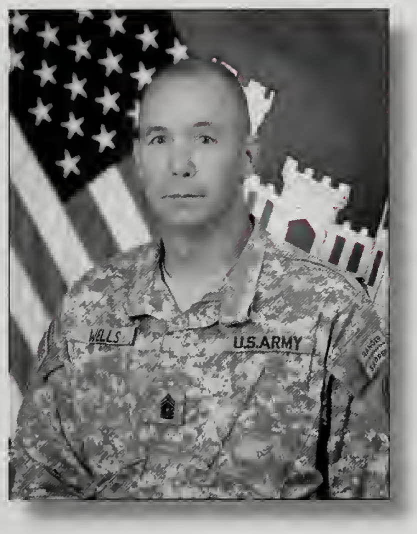
Finally, we will celebrate the rich heritage that is our Engineer Regiment. As in the past, we herald the winners of the Best Sapper Competition and pay tribute to the small units and junior leaders who will receive Regimental Association Awards. We will take a special moment to recognize our Fallen Engineers and highlight our vision of a Fallen Engineer Memorial to be set in red Missouri granite in the Engineer Memorial Grove—the headwaters of our Regiment. Of course, we will also revel in the company of fellow tribesmen—our great family of engineers—at the Engineer Ball.

It will be a spectacular week! I look forward to continuing the professional debate that will set the course of the future. I encourage you to attend if possible…and to be with us in spirit if you cannot.

Lead to Serve. Essayons!

Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School



There are more than 74,000 enlisted engineers in the Army, and every one of them should have a voice at our yearly conference. I hope to see a large turnout of enlisted engineer leaders at ENFORCE 2010. It's a great opportunity to rekindle old friendships and create new ones. Our experiences over the past nine years have transformed a Regiment that focused on major combat operations to a Regiment that operates on a battlefield without an easily recognizable enemy. The training and preparation of our formations is just as complicated when you account for the variety of missions required of an engineer and the short amount of time we have to prepare for the next deployment. There's no better place to discuss these issues with engineer leaders from across the Regiment than at ENFORCE.

The Regiment recognizes that it's that time to institute counter-improvised explosive device (C-IED) training—beginning with basic combat training and continuing to the Sergeants Major Academy—and the same goes for warrant officer and officer training. We will have started C-IED training by the time you get to ENFORCE, and I hope you'll take time to observe what we're doing for young engineers. This is a big shift in what we require of young Soldiers during basic combat training. Observing their surroundings and reporting anomalies isn't something they are used to doing, especially when they're marching from one training event to another. Then, their only concern is staying no more than 5 meters behind the Soldier in front of them. Young Soldiers tend to shut out everything when doing routine tasks like conducting a movement, where they should be treating it like a movement to contact. The attention to detail outside the wire should be at, or above, the same level of concentration they devote to playing a video game. Soldiers should be completely absorbed in the environment. Every minute outside the wire is an opportunity to gather intelligence and save lives.

We have an imbalance of C-IED proficiency in the NCO Corps. Standardizing certain individual and collective tasks as the baseline standard will give NCOs a good foundation to implement C-IED training in units. We'll tackle the tasks required of an engineer leader in support of C-IED operations—from intelligence, surveillance, and reconnaissance (ISR) requirements to vehicle recovery. This year we'll start defining the responsibilities of first sergeants to platoons and how they can leverage battalion support systems.

Robots are here to stay. I'd argue that light fighters need robots just as much as, if not more than, mounted Soldiers. Robots should be thought of in the same context as any breaching equipment. Ask yourself which you would choose if given a choice of investigating an active explosive device with a robot or with Sapper Wells. Sapper Wells would definitely choose the robot.

The Army's College of the American Soldier (CAS) is a great program for engineers seeking to complete their college degree. SGM William Bennett, at the Engineer School's Directorate of Training and Leader Development, has led the Regiment's efforts to leverage a pure, online degree program with Touro University specifically tailored for engineer Soldiers fighting in full spectrum operations. The CAS program will ensure that Soldiers are not tied to a specific satellite college or university and won't PCS and find out that the school doesn't have a local office, thereby requiring that they change schools and perhaps lose some of the credits they have earned. With the CAS program, they'll be able to complete their degree anywhere—Fort Bragg, Hawaii, Korea, Jalalabad, or Mosul.

Our partners in industry will be at ENFORCE, displaying either new or prototype equipment. Attending the conference will give Soldiers the chance to make a difference in the design or construction of future engineer equipment.

It looks as if our Regiment will offer one of the strongest fields for this year's Best Sapper Competition. It's a great competition, and we hope to broadcast it for our deployed engineers to enjoy. Sappers in training should not expect exactly the same events as last year, since the competition, as well as the Sapper Leader Course, is continually updating its instruction to maintain relevancy with our formations.

Our fraternal organizations stand proudly behind our efforts in the evolution of the Army Engineer. They are part of our culture—a fraternity of past heroes of the Regiment who have nothing but the best intentions for engineers young and old. Without their support, this annual gathering of the best engineers in the world would not be possible.

The ENFORCE conference is unique in that we look at the past year's accomplishments, recognize heroic engineers, celebrate the lives of fallen engineers, and make plans for future endeavors. I hope to see you there.

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer

This year's ENFORCE promises to be one of the best ever held here at Fort Leonard Wood. In addition to receiving a Regimental Campaign Plan update from BG Watson, the Engineer School Commandant, attendees can participate in wide-ranging activities such as Warfighter Forums, professional development seminars on the latest construction management techniques and practices and other subjects, Best Sapper Competition, Regimental Association Award presentations, and equipment displays and attend a special ceremony to recognize our Fallen Engineers. The week concludes with the Engineer Regimental Ball, which is always a hit with our participants. My message to you: If you are the senior engineer warrant officer in your organization, ENFORCE is THE place to be. I look forward to seeing you there.

In addition to the activities listed above, we will hold our second annual Council of Engineer Warrant Officers and recognize the Warrant Officers of the Year for the USAR, ARNG, and Active Army. Our first Council was a great success and led to many of the initiatives recently approved and/or implemented. I am pleased to announce that the Army has approved our proposal to retitle our two warrant officer MOSs to better reflect today's missions. Effective 1 February 2010, our Utilities Operation and Maintenance Technician MOS title changed to Construction Engineering Technician and our Geospatial Information Technician title changed to Geospatial Engineering Technician. TRADOC also approved changes in the Standards of Grades for both 210As and 215Ds to reflect the changes in rank structure in our units due to modularity. TDAs and MTOEs will be changed to reflect the name changes and grade adjustments.

I am pleased to announce that CW4 (R) Jim Flinn has been nominated to serve as the next Honorary Chief Warrant Officer of the Regiment. CW4 (R) Flinn completed his stellar career right here at Fort Leonard Wood, and we look forward to seeing him at this year's ENFORCE and the Regimental Dinner. I want to take this time to personally thank CW5 (R) Jeffrey Popp for his outstanding performance during his tenure as Honorary Chief Warrant Officer of the Regiment. He has represented the Regiment and its members well. The title of Honorary Chief Warrant Officer of the Regiment is one more accomplishment to add to the notable credits for his distinguished career. Thank you, Jeff, for a job well done.

In professional development news, the long-awaited update to DA Pamphlet 600-3, *Commissioned Officer Professional Development and Career Management*, hit the street on 1 February 2010. The pamphlet serves primarily as a professional development guide for all officers. Perhaps most important, it serves as a mentoring tool for leaders at all levels and is an important personnel management guide for assignment officers, proponents, and HQDA selection board members. Chapter 14 covers Engineer Branch officers and warrant officers. General information on all warrant officers can be found in Chapter 3. Reserve Component warrant officer information can be found in Chapter 7. Detailed career development information on Construction Engineering Technicians and Geospatial Engineering Technicians can be found beginning on page 127 of Chapter 14. Included in this chapter are the Warrant Officer Development Models, otherwise known as Career Maps, for both MOSs. I highly encourage you to download a copy of this new update and use it as a guide to manage your career. Provide a copy to your rater and senior rater during your OER counseling sessions. Equally as important is that you read and understand our fellow engineer Officers' Professional Development Model and Career Map.

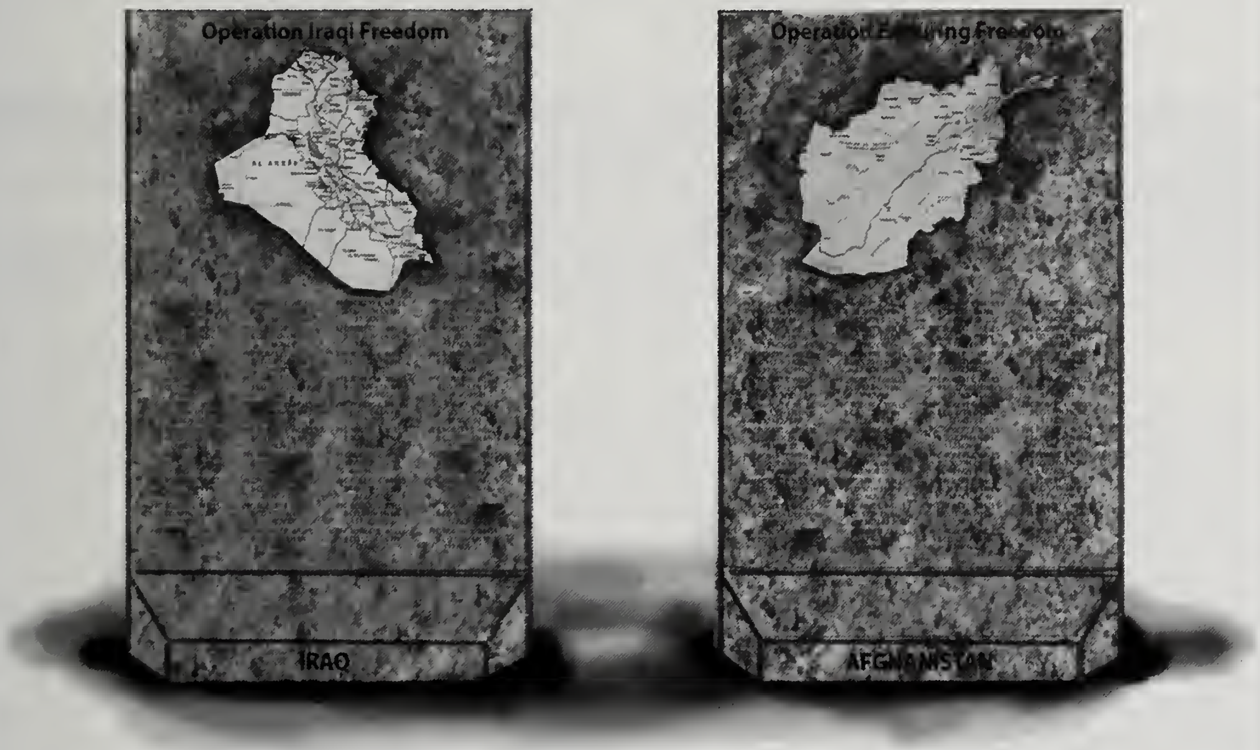
The next engineer warrant officer accessions board will be held in July. I can't stress enough that we are still hiring both Construction Engineering Technicians and Geospatial Engineering Technicians. To assist you in recruiting your replacements, WO1 Kent Frye has posted the latest versions of our 210A/120A and 215D/125D recruiting trifold on Warrant Officer Net. Click on the Engineer icon and you can download the files for your use. We are looking for outstanding NCOs who possess a sustained and demonstrated level of technical and leadership competency as supported by rater and senior rater comments on NCOERs. For commanders and warrant officers in the field, when asked for a letter of recommendation, I urge you to only recommend your best NCOs for the warrant officer program. For more information about the upcoming board or how to become an engineer warrant officer, log on to the Army recruiting website at *<http://www.usarec.army.mil/hq/warrant>*. Until next time, stay safe. Essayons!

Dedication

The following member of the Engineer Regiment has been lost in the War on Terrorism since the last issue of *Engineer*. He is the 299th Fallen Engineer since the War began. We dedicate this issue to him.

Hickman, Sergeant First Class Jason O.B.	4th Brigade Combat Team (Airborne), 25th Infantry Division	Fort Richardson, Alaska

Proposed Fallen Engineers Memorial



One of the highest priorities of the Army Engineer Association (AEA) is to recognize all Army engineers who have given their lives in the defense of the United States of America. Equally important is to recognize those engineers who received wounds in combat resulting in the award of the Purple Heart. AEA is accepting donations to support the design and construction of a Memorial Wall for Fallen Engineers to be located in the "Sapper Grove" at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment. To learn more, go to <*http://www.armyengineer.com/memorial_wall.html*>.

ENFORCE Campaign Plan Work Groups

By Mr. Michael A. Dascanio

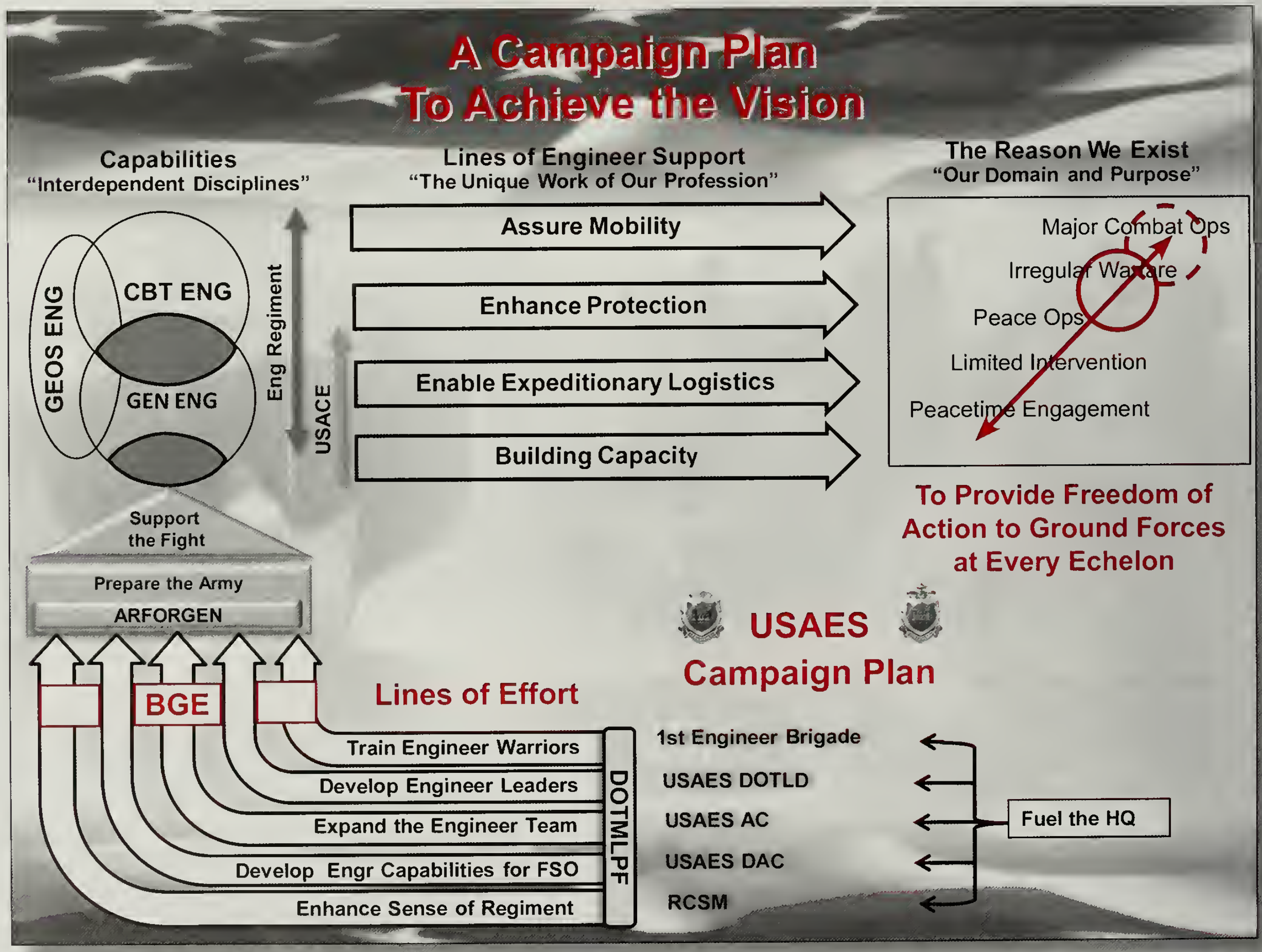
One of the key events of this year's ENFORCE is the Campaign Plan Work Group Program. The task and purpose of the work groups is to review the Regimental Campaign Plan to update the current status of the lines of effort (LOE), prioritize current decisive points, and discuss possible additional decisive points.

In this era of evolving national strategy, persistent conflict, Army Force Generation (ARFORGEN), transformation, and constrained resources, this hard work is harder—and more complex—than ever. Yet, as professionals, our charter is to achieve our vision in spite of existing conditions. But to do so successfully, we must first understand the framework within which we operate.

So…why a campaign plan, you ask? Every profession has a vision, purpose, and reason to exist, but simply having a vision is not good enough. There must be a plan and action. And that action—in order to be comprehensive, coordinated, and synchronized—must be organized, prioritized, assigned, guided, and monitored to achieve any measure of success. Professionals do this hard work; amateurs don't.

Military engineering is a subprofession within the greater profession of arms. The Engineer Regiment is the manifestation of this profession within the Army. It is a body of people—not just equipment, organizations, or technology—with a passion or calling to serve as a warrior with unique technical skills. These technical skills set the Engineer Regiment apart, providing unique knowledge, services, and capabilities that the Army needs to accomplish its missions.

By analyzing this framework within the context of the existing conditions, we've learned much about ourselves. While doing so, we discovered the need to revise and reenergize our vision and mission, and develop a clear strategy—translated into an executable campaign plan—to achieve our vision.



A Campaign Plan To Achieve the Vision

Capabilities
"Interdependent Disciplines"

Lines of Engineer Support
"The Unique Work of Our Profession"

The Reason We Exist
"Our Domain and Purpose"

Assure Mobility
Enhance Protection
Enable Expeditionary Logistics
Building Capacity

Major Combat Ops
Irregular Warfare
Peace Ops
Limited Intervention
Peacetime Engagement

To Provide Freedom of Action to Ground Forces at Every Echelon

USAES Campaign Plan

Lines of Effort

Train Engineer Warriors
Develop Engineer Leaders
Expand the Engineer Team
Develop Engr Capabilities for FSO
Enhance Sense of Regiment

1st Engineer Brigade
USAES DOTLD
USAES AC
USAES DAC
RCSM

Fuel the HQ

ENFORCE Campaign Plan Work Groups

WG1	WG2	WG3	WG4	WG5
Topic: Train Engineer Warriors	Topic: Develop Engineer Leaders	Topic: Expand the Engineer Team	Topic: Develop Engineer Capabilities	Topic: Enhance Sense of Regiment

Wednesday PM: Work groups (task/purpose) introduced during Commandant's Campaign Plan Update

Thursday AM: Work group leads present current status of the LOE

Thursday PM: Work groups prioritize the decisive points and discuss potential additional decisive points

Friday AM: Work group leads backbrief

** Final room assignments depend on estimated size of work groups.

Five work groups will spend the morning session of Thursday, 22 April, reviewing their respective decisive points and gaining a strong understanding of their status. In the afternoon session, the groups will prioritize their decisive points within their LOE and discuss potential adjustments to the LOE. On Friday, the groups will gather in the auditorium as a collective body and provide backbriefs on their group's discussions and recommendations.

Train Engineer Warriors. Led by the 1st Engineer Brigade, this work group will focus on how we execute institutional training within our Regiment. Key discussion topics will include updates to the Sapper Leader Course and Basic Officer Leader Course and developing plans for institutionalizing Counter Explosive Hazards Center (CEHC) training.

Develop Engineer Leaders. Led by the Directorate of Training and Leader Development (DOTLD), this work group will address several important decisive points, to include the Engineer University Concept, Virtual Battlespace System (VBS2) development, and Officer Education System (OES) redesign. Discussions will include an explanation of the Engineer University white paper, which is the concept for developing engineer core training and electives. We will also discuss the VBS2 integration initiatives, which are rapidly revolutionizing classroom training into an interactive environment. Finally, many will have great interest in providing feedback on the current status of the Regiment's OES training.

Expand the Engineer Team. Led by the Engineer School's Assistant Commandant, this work group will discuss decisive points that include establishing a governance framework of engineer forums; developing joint, interagency, intergovernmental, multinational, industry, and academia (JIIM-IA) partnerships; and establishing a Liaison Officer (LNO)/Exchange Orientation Program with our sister Services.

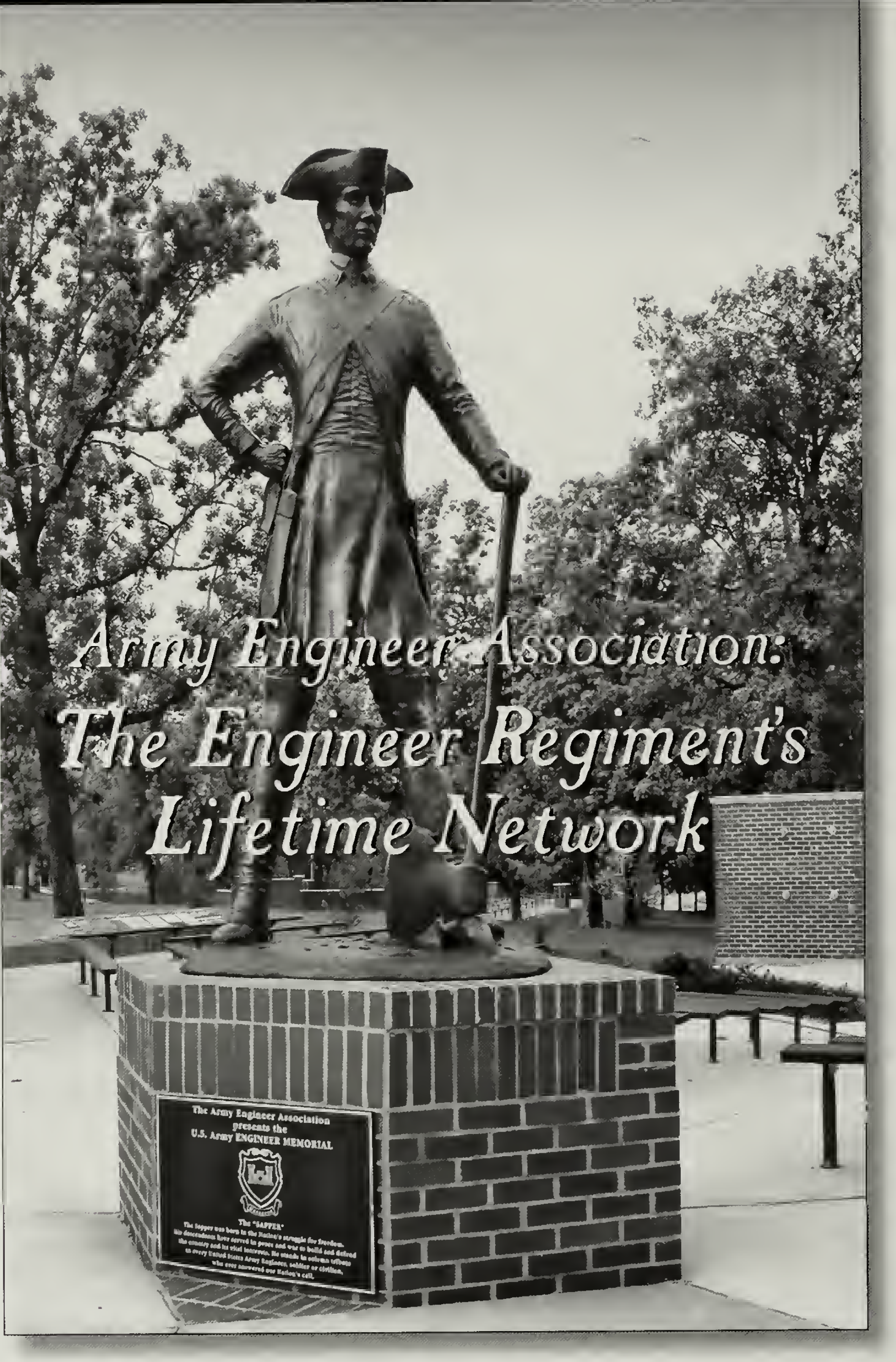
Develop Engineer Capabilities for Full Spectrum Operations. Led by the Engineer School's Deputy Assistant Commandant, this work group will focus on the decisive points that help us as a Regiment to synchronize doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF), with emphasis on the elements that are actioned outside the Engineer School, primarily by the Maneuver Support Center of Excellence (MSCoE). Decisive points in this LOE include initiatives in the areas of doctrine, organization, and equipment. Several geospatial initiatives, along with the emerging base camp proponency, are also included in this LOE. Key discussion topics will include the Brigade Engineer Battalion proposal, explosive hazard detection systems, the migration to a mil-Wiki type of publications, the geospatial intelligence (GEOINT) concept, rules of allocation, and a review of our equipment portfolio.

Enhance a Sense of Regiment. Led by the Regimental Command Sergeant Major, this work group will discuss the Fallen Sapper Program and the Wounded Sapper Program. The group will also discuss how we can help the Army Engineer Association (AEA) refocus their roles and adjust to a younger target audience and how we can develop a Regimental Information Engagement Plan.

We are looking forward to your active participation in these work groups in order to ensure that we have identified the right focus for our Regiment, which will enable the Engineer Regiment to successfully support our Army well into the future.

Mr. Dascanio is a lieutenant colonel in the United States Army Reserve. He serves as the acting Director of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri.

Army Engineer Association: The Engineer Regiment's Lifetime Network



By Colonel Jack O'Neill (Retired)

The Army Engineer Association (AEA) is evolving and adapting to change, just as our units and leaders are meeting today's challenges. Founded in 1988 as the Engineer Regimental Association during then Major General Daniel R. Schroeder's tenure as commandant of the United States Army Engineer School, it became the AEA in December 1991. It was envisioned to be a branch and alumni association for all Army engineers, regardless of grade, component, or specialty. That purpose is still valid, and since 1991 the AEA board of directors and staff have shared, promoted, and rewarded the proud accomplishments of the Regiment. AEA has grown and matured quite well, publishing the superb bimonthly *Army Engineer Magazine*; providing a host of regimental recognition programs; operating a successful gift store in the United States Army Engineer Museum at Fort Leonard Wood, Missouri; and offering a variety of events to foster the unique partnership between the Regiment and industry.

Program Improvements

But AEA membership has not sustained a steady period of growth. Thanks to suggestions by Brigadier General Bryan G. Watson, Commandant of the Engineer School, we closely reexamined our member benefits and incentives and are now launching an improved set of programs. Every member of the Regiment can benefit in some way by being an AEA member, and AEA benefits endure for a lifetime. The central theme of AEA is sharing and giving back: sharing knowledge, experiences, ideas, and opportunities through the network and giving back to the Regiment by supporting worthwhile AEA awards and programs.

Engineer Fraternal Network for Life

Our Army engineer family is a proud and powerful network of thousands of professionals. Consider the 80,000 engineer Soldiers in the Active Army, United States Army National Guard, and United States Army Reserve; the 35,000 Soldiers and civilians of the United States Army Corps of Engineers major Army command; the engineers performing installation public works across the Army; and all the engineer veterans of those organizations. That's a huge number.

AEA is the linchpin for that network. We manage a comprehensive professional and historical information network through our magazine, website, and e-mail announcements. AEA's links to engineer alumni organizations, combined with our new presence on Facebook, add to our social network feature, and our business services to supporting firm members from industry enable AEA to provide specialized job networking and an online career center.

Remembering Our Fallen

AEA established a web-based regimental memorial register at <*www.armyengineer.com/index.html*> that lists the names of our comrades lost since the terrorist attacks of 11 September 2001. AEA also provides information to help survivors of those fallen. We are raising funds to erect a

"AEA assists engineer Wounded Warriors by supporting fund-raising efforts, promoting job opportunities, and reaching out to them in our communities. ... Look for them, reach out, and help them stay connected to the engineer fraternal network for life."

memorial wall honoring fallen engineers of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) at Fort Leonard Wood, and we have a new $2,500 annual scholarship award for a survivor of a Fallen Engineer from OIF or OEF.

Helping Our Wounded

AEA assists engineer Wounded Warriors by supporting fund-raising efforts, promoting job opportunities, and reaching out to them in our communities. They need help and they're all around us, in hospitals or in our communities, healing and coping. Look for them, reach out, and help them stay connected to the engineer fraternal network for life. We also have a new $2,500 annual scholarship award for a combat-wounded engineer from OIF or OEF.

Recognizing and Rewarding Our Best

AEA administers multiple award programs that recognize individual and team excellence in the Regiment. AEA-sponsored components of the United States Army Engineer Regimental Award Program, enabled mostly by corporate sponsors, are as follows:

- DeFleury Medal for professional excellence
- Essayons Award for spouses who make significant contributions to the Regiment
- Army Combat Engineer Sergeants (ACES) Award for the best squad leader/section sergeant in every engineer battalion, separate engineer company/detachment in all components
- Best Platoon Leader Award for the top engineer platoon leaders in the Active Army and Reserve Component
- Van Autreve Award for the engineer Soldier of the Year, named for Sergeant Major of the Army Leon L. Van Autreve
- Super Sapper Awards for the best junior engineer Soldier in each battalion or separate company-size unit in the force
- Flowers Award for Best Sapper Team for the winner of the annual competition at Fort Leonard Wood, named for Lieutenant General Robert B. Flowers (Retired)
- Best Warrant Officer Award for the Active Army and Reserve Component
- Lieutenant General (John W.) Morris Outstanding Civilian Award

Supporting Junior Members and Families

Junior members enjoy the most benefit from AEA. First, the annual dues structure is designed to benefit them. Second, the majority of our annual Soldier memorial scholarships are offered only to junior members. AEA recognition programs that emphasize junior members include the ACES, Best Platoon Leader, Van Autreve, and Super Sapper awards. Family member benefits include a limited number of scholarships and the spouse-focused Essayons Award.

Chapters

AEA chapters are out there, although some are more active than others. AEA has a quick-and-easy "Chapter in a Box" document to assist any group interested in forming a chapter. Several of the brigade-level chapters have recently organized top-notch events and conferences. The Montgomery C. Meigs Chapter in Washington, D.C., annually supports the area Castle Ball, and brigade-level senior leader conferences have been quite successful for the 18th, 20th, and 36th Engineer Brigades. Local chapters can support a variety of events such as unit runs, sports tournaments, award ceremonies, formal dinners and military balls, meetings, and conferences. Some chapters enjoy local sponsorship from area businesses.

Engineer Regimental Store

Long established in the Engineer Museum at Fort Leonard Wood, the AEA Regimental Store is a true asset to the Regiment. Proceeds from the store support the museum and the many AEA programs and services oriented toward service to the Engineer Regiment. The store serves members of the Regiment, family members, and alumni of the United States Army Corps of Engineers, providing a wide variety of one-of-a-kind merchandise.

Conclusion

AEA provides a worthwhile and affordable service to the Engineer Regiment. If you're a leader of engineers, informing others of the benefits of AEA is part of taking care of your people. You can legally advise them that they can benefit from joining AEA and simply provide them with information about what those benefits are. They can share and give back too.

Colonel O'Neill (Retired) is a 30-year veteran of the United States Army Corps of Engineers and has been the executive director of AEA since March 1998. AEA has offices at Fort Belvoir, Virginia, and in the Engineer Museum at Fort Leonard Wood, Missouri.

Adapting the Army:

Institutionalizing Counter-IED Training Efforts

By Mr. Dorian D'Aria and Mrs. Tahnee L. Moore

The success of U.S. forces during the early phases of combat in Afghanistan and Iraq provides testimony to the competence of American Soldiers, the superiority of their equipment, and the exceptional quality of their training. However, after the conclusion of conventional combat operations, our Soldiers faced a resilient and adaptive enemy bent on continuing the fight and hindering any transition to peace, democracy, and public order. To do this, our enemy had to change the conditions of the battle and nullify or defeat elements that gave us superiority. For instance, to defeat our long-range weapons and standoff capabilities, he hid among the populace and attacked us at close quarters. He avoided force-on-force combat by employing improvised explosive devices (IEDs) plus hit-and-run tactics against convoys and units to inflict casualties. He buried explosives to attack our vehicles from beneath and attempted to emplace explosively formed penetrators to defeat U.S. detection and neutralization systems.

Keeping Training Relevant

The enemy's success depended greatly on his ability to be flexible, adaptive, and able to operate on timelines inside our standard Cold War institutional processes. He could change tactics, techniques, and procedures or employ new devices periodically, continually forcing us to play catch-up and rendering our institutional training or materiel systems irrelevant against the current threat by the time they were fielded. Although counter-IED (C-IED) training occurred throughout the many training domains, much of the training lacked integration and standardization. This led to a move toward consistency in skill levels and interest in the collective tasks trained at unit home stations. As a consequence, much of the most relevant training and preparation for combat shifted from the generating force to the operational force, complicating deployment preparation and mission readiness.

Considering personnel turnover between rotations, this often presented units with a steep learning curve and forced a lot of predeployment training to concentrate on the fundamentals. Instead of focusing on collective unit training and mission readiness exercises, many units were burdened with learning individual C-IED tasks, irregular warfare counterinsurgency principles, threat analysis, and an understanding of what C-IED assets are available to tailor capabilities based on the threat and operational conditions. In addition, because of the pervasive misconception that our current operational dilemma was unique, theater-specific, and of a limited duration, there was little incentive to alter the status quo and rectify our training strategy. Figure 1, page 11, depicts how we are training C-IED efforts today.

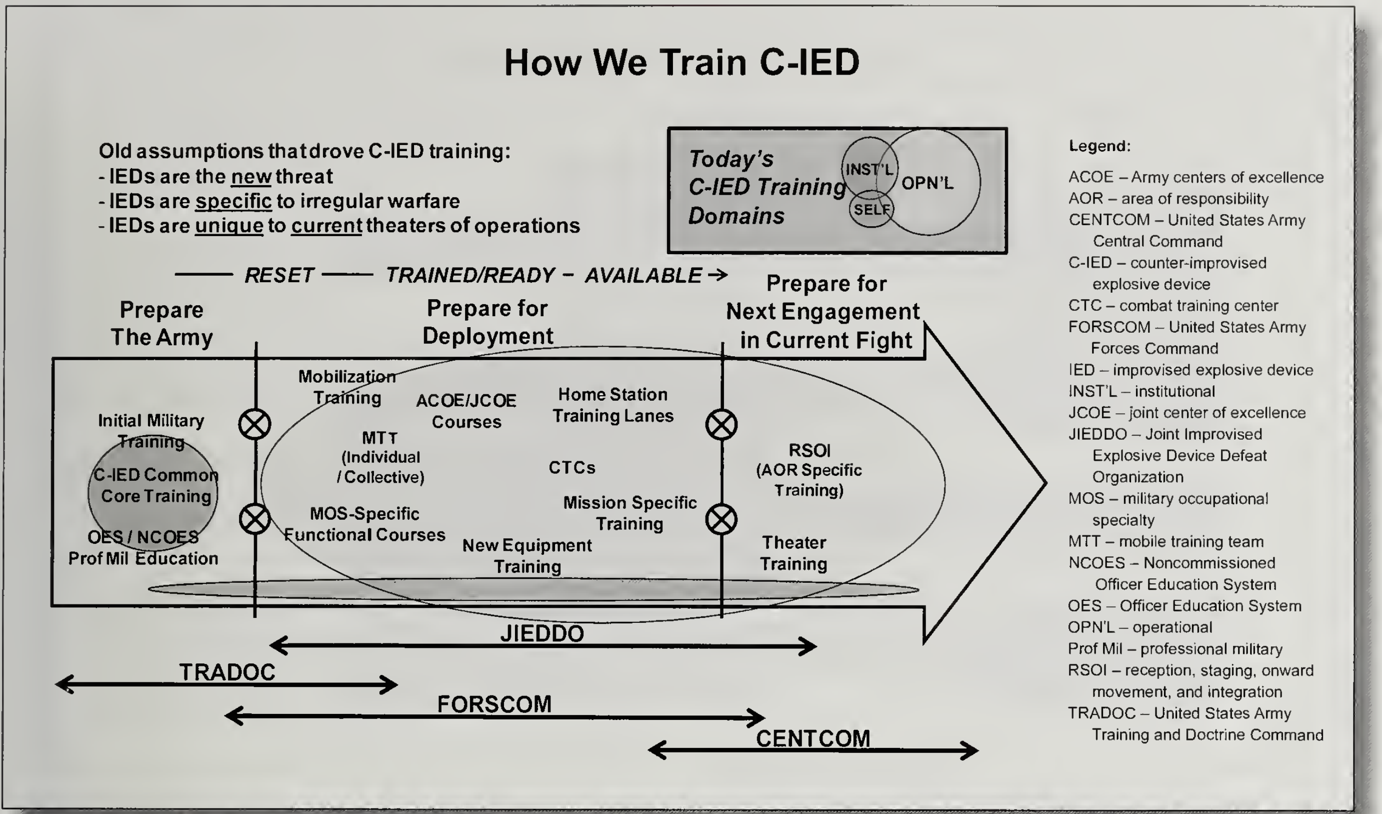
Current U.S. training has been based on the following outdated misconceptions:

- *IEDs are a new threat.* However, IEDs are an enduring threat that have been used since the invention of explosives.
- *IEDs are specific to irregular warfare.* Instead, IEDs are used throughout the full spectrum of warfare.
- *IEDs are unique to current theaters of operation.* This is incorrect. IEDs are prevalent in every global region, to include foreign and domestic areas of operation.

Keeping Training Balanced

In response to the enduring nature of the threat, C-IED training must become more balanced between the institutional and operational domains. Standardization and required implementation of common C-IED training in initial military training and professional military education (PME) is the first step. The next step will be to determine what C-IED lessons should migrate from current operational training requirements to the institutional domain. The migration of critical training ensures a standardized basis of training and provides commanders with more time and flexibility while preparing their units for deployment. This shift in training would result in a more balanced C-IED strategy, as depicted in Figure 2, page 11.

To transform C-IED training in the United States Army Training and Doctrine Command (TRADOC), the TRADOC commander tasked the Maneuver Support Center of



How We Train C-IED

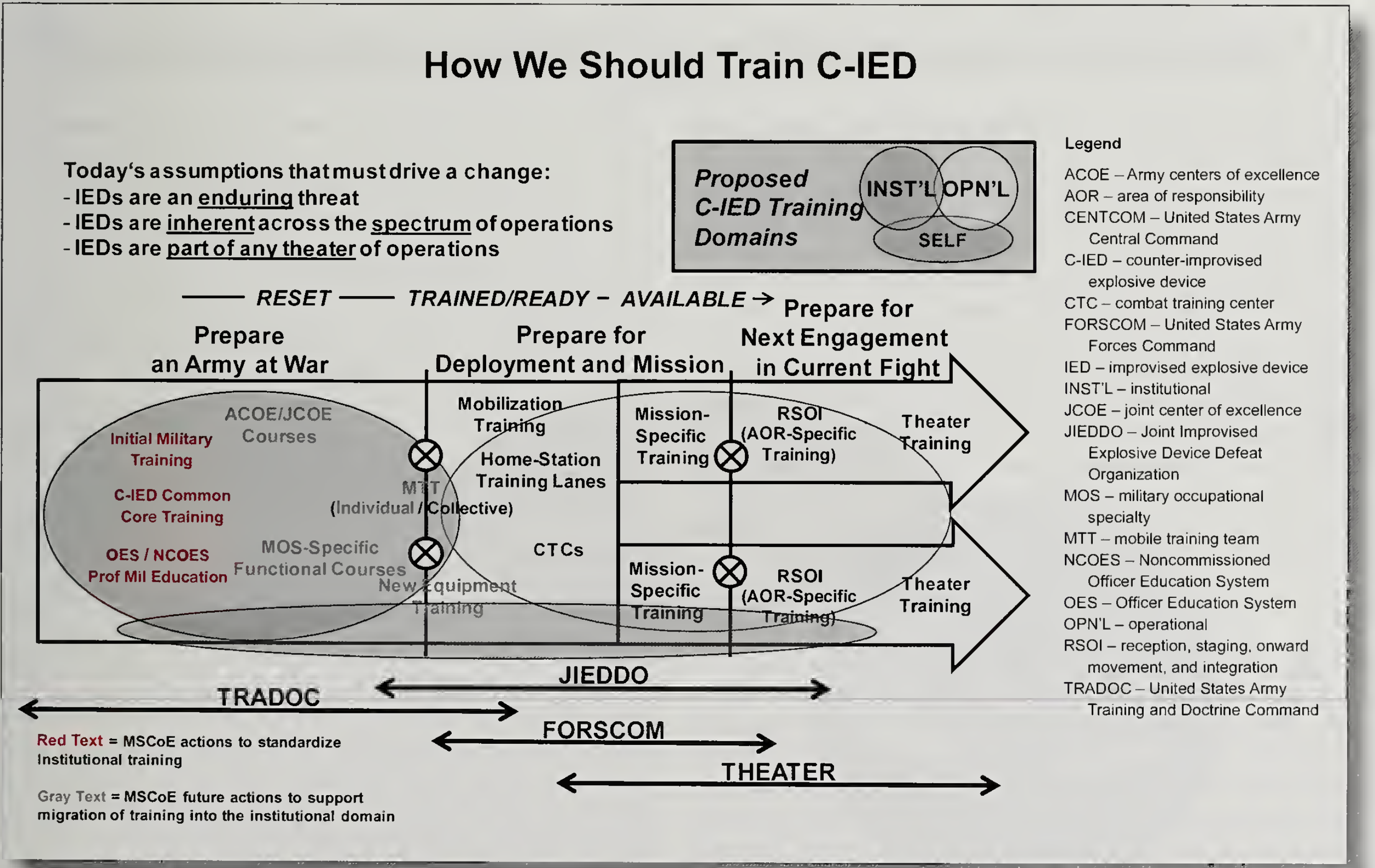
Old assumptions that drove C-IED training:
- IEDs are the new threat
- IEDs are specific to irregular warfare
- IEDs are unique to current theaters of operations

Today's C-IED Training Domains
INST'L
OPN'L
SELF
RESET
TRAINED/READY – AVAILABLE →
Prepare The Army
Prepare for Deployment
Prepare for Next Engagement in Current Fight
Initial Military Training
C-IED Common Core Training
OES / NCOES Prof Mil Education
Mobilization Training
MTT (Individual / Collective)
MOS-Specific Functional Courses
ACOE/JCOE Courses
Home Station Training Lanes
CTCs
Mission Specific Training
New Equipment Training
RSOI (AOR Specific Training)
Theater Training
JIEDDO
TRADOC
FORSCOM
CENTCOM

Legend:

ACOE – Army centers of excellence
AOR – area of responsibility
CENTCOM – United States Army Central Command
C-IED – counter-improvised explosive device
CTC – combat training center
FORSCOM – United States Army Forces Command
IED – improvised explosive device
INST'L – institutional
JCOE – joint center of excellence
JIEDDO – Joint Improvised Explosive Device Defeat Organization
MOS – military occupational specialty
MTT – mobile training team
NCOES – Noncommissioned Officer Education System
OES – Officer Education System
OPN'L – operational
Prof Mil – professional military
RSOI – reception, staging, onward movement, and integration
TRADOC – United States Army Training and Doctrine Command

Figure 1



How We Should Train C-IED

Today's assumptions that must drive a change:
- IEDs are an enduring threat
- IEDs are inherent across the spectrum of operations
- IEDs are part of any theater of operations

Proposed C-IED Training Domains
INST'L
OPN'L
SELF
RESET
TRAINED/READY – AVAILABLE →
Prepare an Army at War
Prepare for Deployment and Mission
Prepare for Next Engagement in Current Fight
Initial Military Training
C-IED Common Core Training
OES / NCOES Prof Mil Education
ACOE/JCOE Courses
MTT (Individual / Collective)
MOS-Specific Functional Courses
Mobilization Training
Home-Station Training Lanes
CTCs
New Equipment Training
Mission-Specific Training
RSOI (AOR-Specific Training)
Theater Training
Mission-Specific Training
RSOI (AOR-Specific Training)
Theater Training
JIEDDO
TRADOC
FORSCOM
THEATER

Red Text = MSCoE actions to standardize Institutional training

Gray Text = MSCoE future actions to support migration of training into the institutional domain

Legend

ACOE – Army centers of excellence
AOR – area of responsibility
CENTCOM – United States Army Central Command
C-IED – counter-improvised explosive device
CTC – combat training center
FORSCOM – United States Army Forces Command
IED – improvised explosive device
INST'L – institutional
JCOE – joint center of excellence
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MOS – military occupational specialty
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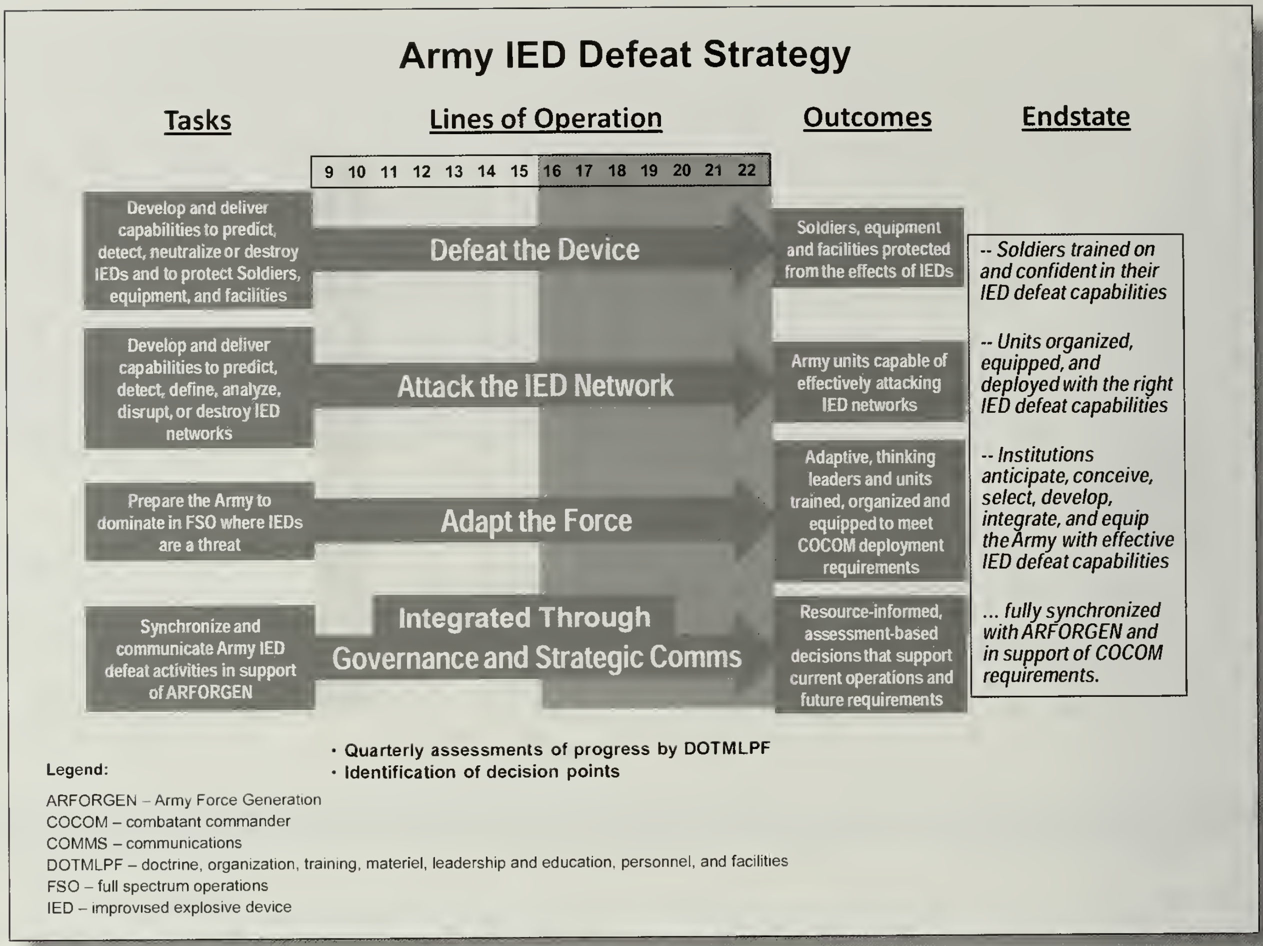
NCOES – Noncommissioned Officer Education System
OES – Officer Education System
OPN'L – operational
RSOI – reception, staging, onward movement, and integration
TRADOC – United States Army Training and Doctrine Command

Figure 2



Army IED Defeat Strategy

Tasks | **Lines of Operation** | **Outcomes** | **Endstate**

9 10 11 12 13 14 15 16 17 18 19 20 21 22

- Develop and deliver capabilities to predict, detect, neutralize or destroy IEDs and to protect Soldiers, equipment, and facilities → Defeat the Device → Soldiers, equipment and facilities protected from the effects of IEDs
- Develop and deliver capabilities to predict, detect, define, analyze, disrupt, or destroy IED networks → Attack the IED Network → Army units capable of effectively attacking IED networks
- Prepare the Army to dominate in FSO where IEDs are a threat → Adapt the Force → Adaptive, thinking leaders and units trained, organized and equipped to meet COCOM deployment requirements
- Synchronize and communicate Army IED defeat activities in support of ARFORGEN → Integrated Through Governance and Strategic Comms → Resource-informed, assessment-based decisions that support current operations and future requirements

-- Soldiers trained on and confident in their IED defeat capabilities

-- Units organized, equipped, and deployed with the right IED defeat capabilities

-- Institutions anticipate, conceive, select, develop, integrate, and equip the Army with effective IED defeat capabilities

... fully synchronized with ARFORGEN and in support of COCOM requirements.

- Quarterly assessments of progress by DOTMLPF
- Identification of decision points

Legend:

ARFORGEN – Army Force Generation
COCOM – combatant commander
COMMS – communications
DOTMLPF – doctrine, organization, training, materiel, leadership and education, personnel, and facilities
FSO – full spectrum operations
IED – improvised explosive device

Figure 3

Excellence at Fort Leonard Wood, Missouri—in collaboration with other proponent leaders and centers of excellence—to develop an integrated, standardized program for C-IED training and education. To treat the IED as an enduring threat and prepare units to use pooled capabilities of their combined arms resources requires the Army to embed C-IED training across its educational system. This training must align C-IED tasks with specific training and educational outcomes that complement and reinforce subsequent skill levels, resulting in an integrated hierarchy of knowledge. Because the use of the IED against U.S. and coalition forces is ever-adapting, continual validation of the C-IED training is an important process of the training integration. The validation process must ensure that the training remains current and relevant to the operating force.

Lines of Operation

After a holistic analysis of the C-IED threat, the Army has identified three primary lines of operation (LOOs)—Defeat the Device, Attack the IED Network, and Adapt the Force—that are pivotal to defeating enemy IEDs. These three LOOs are integrated through an administrative LOO called "Governance and Strategic Comms," which provides synchronization, resourcing, and strategic oversight of all C-IED efforts across the Army. Even though each LOO contains its own unique tasks and training necessary to achieve its specific strategic objective, they also share numerous common tasks that are threaded throughout each. Figure 3 depicts these LOOs and the outcome each produces.

Identify Critical Common Tasks

As the first step toward achieving these goals, the TRADOC Integrated Capabilities Development Team (ICDT) convened a training summit at Fort Leavenworth, Kansas, in November 2009 to identify what C-IED training is needed at each echelon of skills within the Army—from Soldiers entering initial training through senior leaders attending advanced PME. This effort was collaborative, involving expertise from across the Army and the broader Department of Defense C-IED community of practice, with the goal of implementing changes in the spring of 2010. Key to the overall analysis was the identification of critical common tasks that Soldiers must successfully perform to survive and function in a C-IED environment. The analysis entailed a review of current operational needs; Soldier interviews; and study of mobile training team (MTT) tasks, doctrine-related tasks such as the Army universal task list, and educational tasks such as the Automated Systems Approach to Training (ASAT). This analysis provided a basis for Soldier outcomes and defined the skills and knowledge a Soldier must possess to survive and function in a C-IED environment.

Identify Enduring Common Skills

The second step in the analytical process was the identification of enduring common skills that cross Army proponencies. Using all current deconstructed C-IED training and requirements, the summit members acted as a critical task selection board to determine—

- Common-to-all C-IED tasks that will transition into the institutional training domain and be reinforced with the operational training domain.
- Branch-specific tasks critical to combatant commanders to be developed in the formal Army training development process by their respective schools and centers.
- Tasks that cross centers of excellence and formally assign development of those tasks to the C-IED proponent.
- Common-to-some C-IED tasks that would cross specific communities.

Develop a Training Support Package

The third step in the analytical process was the task analysis and development of a training support package to sustain the identified common C-IED critical tasks. This C-IED training package will identify the method and time of instruction and the resources required for the proponent to conduct the training.

Migrate Training to Institutional Domain

The fourth step in the analytic process entailed the migration of current C-IED operational training into the institutional training domain. Within the operational training domain, new equipment training, MTTs, and many functional courses were established to meet the needs of Soldiers moving into theater.

Key to any training strategy is the ability to provide resources for the effort and a timeline that will allow adjustments to the curriculum to ensure that it is relevant to the threat and operational requirements. Much of the C-IED training conducted by numerous schools and home-station organizations has been funded by various joint and Army agencies. However, a large portion of C-IED training within the operational training domain is neither funded nor recognized by the Army resourcing process and primarily uses a variety of contingency fundings. The ICDT, in conjunction with the United States Army Combined Arms Center Collective Training Directorate (CAC-CTD) has started the resource legitimization process using the Combined Arms Training Strategy (CATS). CAC-CTD incorporated the three C-IED-associated tasks from the Shared Collective Task List (SCTL) into the protection functional CATS. The Maneuver Support Center of Excellence linked C-IED training enablers with the SCTLs using the ASAT database. As the CAC ASAT consolidated database for record is uploaded, units across the force will be able to identify C-IED training resources in association with their full spectrum operations mission-essential task list using the Digital Training Management System.

Conclusion

The changes forthcoming in the Army's C-IED training strategy will provide a template and foundation for transforming our institutional training domains to become more flexible and responsive to the operational force and better support the Army Force Generation. It will—

- Tie in requirements with skill sets.
- Ensure integration within educational hierarchies.
- Establish decision points to evaluate and update training.
- Promote better standardization and synchronization across proponencies.
- Link resources to execution.

As a result, these mechanisms will ensure that the institutional domain is better postured to support an Army at war, in any theater around the globe, and be able to respond to any changes in enemy tactics or weapon systems.

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Strengthening the Regiment:

Training and Readiness Authority - Plus

By Lieutenant Colonel Diana M. Holland

On 10 July 2008, the Training and Readiness Authority (TRA) policy took effect for the 92d Engineer Battalion (also known as the Black Diamonds). The policy directed attachment of the battalion to the 36th Engineer Brigade (also known as the Rugged Brigade) at Fort Hood, Texas, for TRA with secondary attachment to the 3d Infantry Division (3ID) at Fort Stewart, Georgia, for administrative control (ADCON)(-)/ Title 10 responsibilities. There was considerable confusion surrounding the policy in the initial months following implementation. Some thought that there would be no difference and that business would continue as usual. Others believed that the geographic distance between the 36th Engineer Brigade and the 92d would hinder complete implementation of TRA. Many concluded that TRA would disrupt effective command and control and that the policy would be rescinded. However, for the Black Diamonds, TRA presented an opportunity for the battalion to formalize a habitual connection with the Engineer Regiment for the first time since the Vietnam War. Thus, the battalion decided to embrace the policy and forge the strongest relationship possible with the 36th Engineer Brigade. This article explains how and why the battalion pursued this decision and describes the resulting benefits.

Weighing the Options

The incoming 3ID and 36th Engineer Brigade leadership encouraged the 92d Engineer Battalion to shape implementation of TRA to best support the Black Diamonds, so the command group considered two options: One was to maintain the status quo and limit the battalion's relationship with the 36th Engineer Brigade to only what was required by the United States Army Forces Command (FORSCOM)—execution order. An alternate approach was "TRA-Plus"[1]—realign as many brigade-level functions as possible with the 36th. The 92d favored the latter approach for three reasons:

- TRA-Plus offered the opportunity to rebuild stronger relationships between engineer units.
- Once the mandatory changes required under TRA were overlaid on pre-TRA practices, the battalion experienced a high rate of conflicting guidance and requirements from different headquarters.
- The situation that evolved in the immediate aftermath of TRA did not appear to be a stable, long-term solution for effective command and control of the battalion, especially considering future deployments of the various headquarters.

Implementing TRA

Some aspects of TRA were straightforward. The policy dictated that the 36th Engineer Brigade would provide training guidance and approve the battalion's training plans and mission-essential task lists, validate deploying units, and review the unit status report. The TRA brigade commander was now in the battalion's rating chain, and the TRA brigade assumed all responsibilities regarding the reenlistment program. In the areas that were specifically tasked to the TRA chain of command but required installation support or oversight, the division coordinated directly with the battalion as though the latter were a separate unit. ADCON(-)/Title 10 responsibilities that remained with 3ID included general court-martial convening authority, installation support, fielding of new equipment, and resources for training approved by the TRA brigade commander. These specified requirements for the 36th Engineer Brigade and 3ID were quickly implemented. However, other areas required further consideration, and until they could be realigned, the actions were processed through the 3d Sustainment Brigade at Fort Stewart.

During this interim period, the battalion concluded that more could and should be done to strengthen ties with the

The 36th Engineer Brigade command sergeant major speaks to Soldiers of the 92d Engineer Battalion during a visit to Fort Stewart.

36th Engineer Brigade. The battalion's leaders used three principles to guide the way ahead:

- Minimize the number of headquarters that handle the same issue.
- Maximize the chain of command (92d to 36th to 3ID) to the greatest extent possible.
- Understand the second- and third-order effects of a course of action. For example, will a recommendation create more work than necessary, and will it stand the test of time?

Following is a discussion of five areas for which the battalion's senior leaders challenged assumptions and made recommendations that would support the Black Diamonds yet facilitate a strong relationship with the 36th Engineer Brigade.

Awards Approval Process

Initially, the battalion processed awards requiring colonel-level approval or endorsement through Fort Stewart's 3d Sustainment Brigade, assuming that such actions would be easier to complete with the headquarters on the same installation. However, with digital technology, geographically distant headquarters could process paperwork just as easily as a colocated headquarters. Thus the question became: Does it make sense to realign this process so that the 36th Engineer Brigade commander approves the battalion's awards? We concluded that it should be realigned, because he was in the rating chain and executed many command responsibilities already. If the award required a general officer's signature, it should be routed back to Fort Stewart and the 3ID commander. Once implemented, this system proved to be very efficient and has reinforced a single chain of command from the 92d Engineer Battalion to the 36th Engineer Brigade to 3ID.

Property Accountability Functions

Similar to the awards process, the 3d Sustainment Brigade commander initially served as the financial liability investigation for property losses (FLIPL) approving official because of his proximity to the battalion. However, as already determined, location was no longer a limiting factor. Again, we concluded that the 36th Engineer Brigade would be the appropriate headquarters to process FLIPLs for the following reasons:

- The 36th was responsible for the Command Supply Discipline Program of the battalion.
- The commander of the 36th was required to approve company changes of command—an event largely influenced by the success of inventories.
- Property accountability is a criterion for evaluation reports, and the TRA colonel is in the rating chain.

Processing FLIPLs, like awards, was just as timely through the distant headquarters as it had been though the colocated ADCON brigade. The revised approval process aligned all property functions with one headquarters and reinforced the primary chain of command.

Installation Functions

The most difficult functions to assign or reassign were those involving installation agencies. Matters such as sexual assault, equal opportunity, the Alcohol and Substance Abuse Program, and safety took several months to resolve. At first, all of these issues remained with the 3d Sustainment Brigade in order to ensure continuity. However, it became clear that the 36th had responsibility for these functions and required input. For example, the Army Readiness Assessment Program (ARAP) is tracked through the TRA headquarters. Likewise, the 36th Engineer Brigade commander has an interest in the battalion's safety program. At times, he directs the battalion to implement

The 36th Engineer Brigade commander observes a 92d Engineer Battalion project at Fort Stewart.

his intent for, and report back on, specific subjects such as motorcycle safety and the battle-buddy program. Similarly, the equal opportunity function is heavily shaped and assessed by training—a TRA function—and because the treatment of Soldiers and allegations of discrimination are command climate issues, it seemed best to align these areas with the 36th Engineer Brigade. In cases that required installation support or senior commander visibility, the battalion reported and worked closely with garrison agencies and 3ID. These revised processes streamlined high-visibility functions through one brigade-level headquarters.

Military Justice

The 92d Engineer Battalion command team also considered the feasibility of shifting special court-martial convening authority responsibilities to the TRA headquarters. Like FLIPLs and awards, much of the paperwork could be completed via digital technology. Furthermore, because the commander of the 36th Engineer Brigade was in the rating chain and responsible for the readiness of the 92d, it seemed that he should be responsible for administrative separations and Uniform Code of Military Justice actions. Leaders specifically considered the possibility of a Soldier who wished to appeal a field grade Article 15 and speak with the brigade commander. Such a situation could be handled using telephonic and video conferencing. However, the battalion concluded that it was best to retain military justice matters at Fort Stewart because of the prominent role of legal advisors—both for the defense and the command. This is the only major brigade-level function that the 36th does not process; however, the battalion commander routinely provides situational awareness of legal issues to the brigade commander.

Deployments

As many garrison procedures were being resolved, important questions emerged regarding deployments:

- What would happen if the 36th or 3ID deployed and the 92d did not?
- Which headquarters would cover the functions that were being formalized?
- Were brigade-level responsibilities transitioning to Fort Hood—only to be returned to Fort Stewart when the 36th deployed?
- Which headquarters would have oversight of the 92d Rear Detachment when the battalion deployed?

The battalion leaders pondered several scenarios and concluded that the ongoing realignment of functions to the 36th Engineer Brigade would stand the test of Army Force Generation (ARFORGEN).

- Many brigade-level TRA headquarters were assigning a colonel to serve as the rear commander, and the headquarters retained the TRA responsibilities of its deploying commander.
- One of the purposes of the mission support element (MSE) at Fort Stewart is to execute ADCON(-)/Title 10 responsibilities for separate FORSCOM units on the installation; thus, whether 3ID was deployed or not, the MSE would support the 92d Engineer Battalion.
- The battalion's rear detachment would report directly to the division rear detachment and the 36th Engineer Brigade's rear detachment—a mirror image of the relationship between the units when they were not deployed.

Recommendations

In a previous article in *Engineer*, the authors stated that in implementing TRA in the 20th Engineer Brigade, Fort Bragg, North Carolina, "given the myriad of tasks a battalion faces daily, weekly, and monthly, a good bit of analysis and common sense was still required to decide which commander would take the lead on a given topic."[2] As it turned out for the 92d, this was an understatement. Every leader and staff officer having to interact with the 92d knew that there were numerous issues that required alignment with a commander, but no one knew enough to consider matters beyond the major functions specified in the FORSCOM order. Therefore, many responsibilities were left undefined, with the understanding that units would deal with them as requirements emerged. The battalion did handle those issues, but each action required time for the staff to develop the process and for the command group to explain its recommendations to other headquarters. Following are three specific recommendations to methodically implement an effective TRA relationship between geographically separated units.

Plan for Implementation

Commanders and staff officers who will be affected by TRA must carefully review the FORSCOM order and develop a detailed plan on how best to implement the policy on their installation and with their TRA units. There was considerable confusion about TRA within many agencies on Fort Stewart. Institutional memory was that the 92d had always "belonged" to a logistics headquarters, and it was difficult to change that notion. Information and reports regarding the 92d were misdirected because relationships had changed. Sometimes, when agencies acknowledged that the 92d was TRA to a brigade on another installation, they stopped sending information at all.

Single-Report Format and Guidance

Leaders should minimize the number of headquarters that have influence on, input to, or require reports from a unit that is separated from its TRA headquarters—or if unable to do so, determine which headquarters has primary responsibility for a particular task and agree on a single-report format and guidance. In the early months after TRA took effect, the 92d received fragmentary orders (FRAGOs) from 3ID, 3d Sustainment Brigade, and 36th Engineer Brigade. Sometimes those orders addressed the same requirement (such as reporting Department of Defense Form 93, *Record of Emergency Data*, updates or motorcycle safety) but contradicted each other. In most cases, the action officers of the different staffs compromised in favor of another headquarters' FRAGO, but the effort required to reach those agreements was time-consuming for everyone involved.

Consistent Functional Chains

To the greatest extent possible, align the major functions with a single headquarters. For example, all personnel tasks for a unit should have a consistent personnel chain. At first, the approval process for the 92d's awards went through the 3d Sustainment Brigade to 3ID; evaluation reports went through the 36th to 3ID; Soldiers were requisitioned through the 36th; and Officer Candidate School packets went directly to 3ID. It took almost a year to align these functions so that all personnel actions flowed to the 36th and back to 3ID. The only functions that were fully aligned along a consistent chain of responsibility upon implementation of TRA were those associated with operations and training—"fair share" taskings, schools, orders, training resources—and it was in these areas that the battalion faced the least friction and confusion.

TRA-Plus Benefits

The TRA policy has greatly benefitted the 92d Engineer Battalion. For example, the 36th Engineer Brigade convened a conference in October at Fort Hood, and all the Black Diamond command teams attended. The conference was an engineer bonding and professional development opportunity that leaders in the 92d do not normally experience in garrison. Similarly, the commander of the 36th, during visits to Fort Stewart or when receiving briefings via teleconference, takes the opportunity to provide guidance and offer professional development to various audiences in the battalion.[3] Finally, as the 92d prepares to deploy to Operation Enduring Freedom, it is able to easily draw on the engineer-specific experiences of other units of the 36th that have recently deployed to that theater. Implementing TRA-Plus has brought even greater benefits to the two organizations by streamlining processes and further strengthening an engineer relationship. The process took more than a year to complete and often encountered institutional resistance, but the results were ultimately worth the effort.

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Endnotes

[1] *TRA-Plus* was a term coined by Brigadier General Bryan G. Watson, United States Army Engineer School Commandant, during a conversation with the author regarding the 92d Engineer Battalion's TRA/ADCON initiatives.

[2] Colonel Duke Deluca, Lieutenant Colonel Fred Kaehler, and Lieutenant Colonel Robert T. Morgan, "TRO [training and readiness oversight]: Clarifying Roles and Responsibilities," *Engineer*, January–March 2007, pp. 11–13.

[3] Though some professional development issues are common to all branches and do not require the specific attention of an engineer colonel, the author believes that there are times when branch does matter, such as in career advice, technical expertise, and engineer capabilities.

Engineers Build Capacity in Stability Operations

By Colonel Jeffrey R. Eckstein

It has been more than a year since the United States Army published Field Manual (FM) 3-07, *Stability Operations.*[1] Army engineers continue to conduct operations in Iraq and Afghanistan, as well as support geographic combatant commands. For most units, nothing has changed. Commanders still must balance the demands for clearance of routes, construction of combat outposts, protection of the force, execution of projects for the Commander's Emergency Response Program (CERP), training of host-nation security forces or local officials, and support for brigade combat teams (BCTs).

The United States Army Corps of Engineers (USACE) element in Iraq—the Gulf Region District—actively executed projects, and commanders balanced similar activities, but the district also supported capacity-development activities. This experience in the 21st century has taught us that we must do more than simply complete construction projects and execute missions in support of maneuver units. Success in the new environment requires the United States to build capacity in partner nations, and the Engineer Regiment is an indispensable component of capacity building. In keeping with the regimental motto of *Essayons*, this article examines the role of United States Army engineers in capacity building and recommends a framework to integrate it into engineer mission planning.

Stability Tasks

FM 3-07 provides the primary stability tasks, enumerating the specific areas that engineer units support. The three core stability tasks are as follows:

Establish Civil Security

Many engineer missions and projects directly support the Army, the maneuver BCTs, and the joint force, including performing route clearance, constructing combat outposts, and ensuring force protection.

Establish Civil Control

Engineer activities involve undertaking or supporting the completion of specific projects for the host nation, such as building or repairing police stations, training areas, and courthouses.

Restore Essential Services

The Army seeks to provide needed services to the host nation, including delivery of food, water, electricity, and medical service. Engineers support Army units that are assigned these missions.

Other Stability Tasks

Two other stability tasks—support to governance and support to economic and infrastructure development—are not part of the core mission-essential task list, but engineers may be required to provide assistance as requested by other agencies.

> ***"Engineers need a stability operations framework to shift the traditional focus ... to a broader strategic perspective of improving host-nation capacity."***

Building Capacity

A review of stability operations in FM 3-34, *Engineer Operations*, reveals a corresponding list of missions and tasks for stability operations. In reference to capacity building, the manual states that "support for infrastructure development may be extended to assist the [host nation] in developing capability and capacity."[2] However, it does not discuss in detail how engineers support capacity or capability development. It focuses on performing assessments of infrastructure features and gaining an understanding of their current situation within the host nation. The manual lists typical missions or projects that engineers may undertake or support, some of which include immediate repairs of infrastructure to support the host nation.[3]

FM 3-34 is the only Army manual to directly address engineer involvement in capacity building, and this is under the heading of infrastructure development. Engineer experiences in Iraq and Afghanistan have involved such elements of capacity building. These efforts include a Multinational Corps–Iraq engineer staff liaison team with the Republic of Iraq Ministry of Oil, USACE subject matter expert support to the Bayji Oil Refinery, and numerous CERP projects focused on improving local services. Yet, these efforts fall short of what is required for success in the 21st century.

FM 3-07 offers a pivotal insight as to the importance of capacity building, stating that "through stability operations, military forces help set the conditions that enable the other elements of national power to succeed in achieving broad goals of conflict transformation."[4] A key aspect of setting the conditions for success—second only to security—is building host-nation capacity from the ground up. Capacity building is the area in which engineers can accomplish their traditional tasks and significantly contribute to setting conditions for successful conflict transformation.

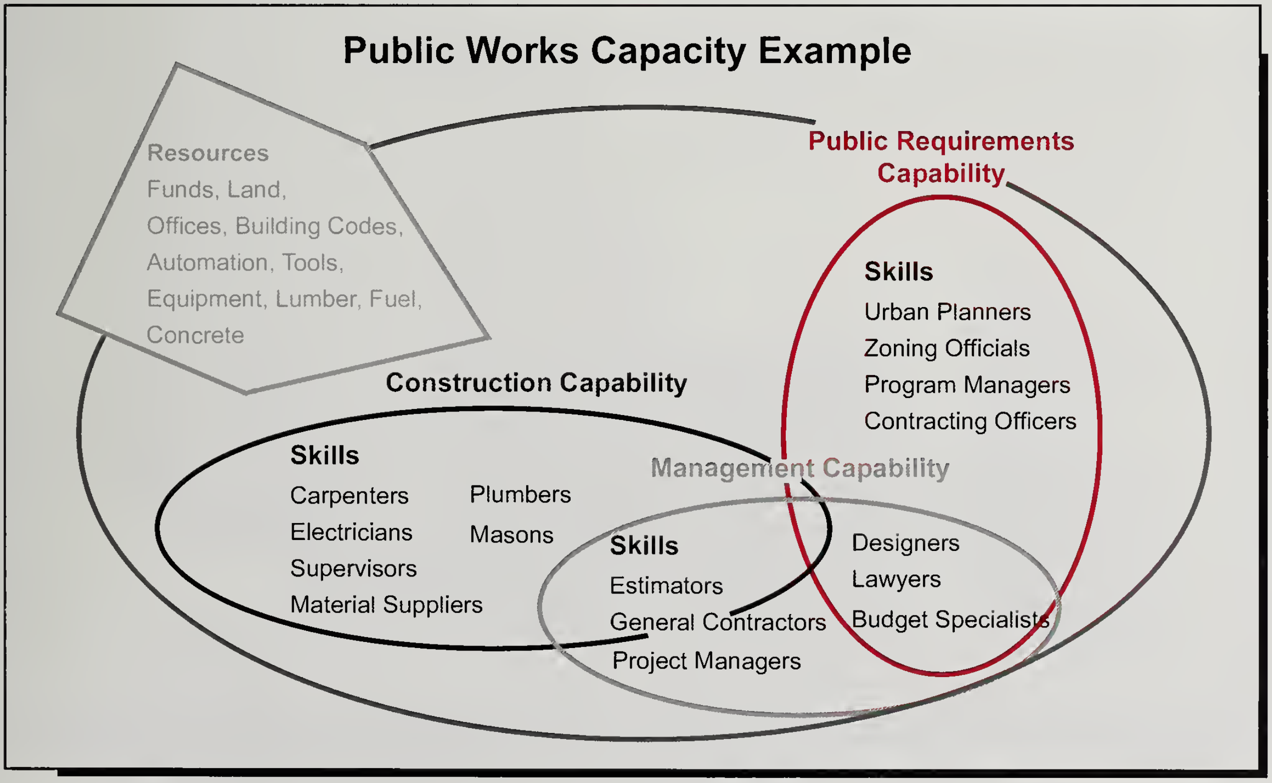
Engineers need a stability operations framework to shift the traditional focus from completing standard projects to a broader strategic perspective of improving host-nation capacity. With such focus, the way engineers execute a project may prove more important to long-term stability than the actual project. Recognizing this, USACE recently published Engineer Regulation 5-1-16, *Capacity Development–International*,[5] requiring all its international projects and programs to incorporate capacity development.

A similar approach for tactical and operational units employed in stability operations is critical. Any framework to assist with analyzing and integrating capacity building in engineer operations must include understanding the relationships among skills, capabilities, and capacity. FM 3-07 provides a definition for capacity building in its glossary: *The process of creating an environment that fosters host-nation institutional development, community participation, human resources development, and strengthening managerial systems.*[6] From this definition, it is clear that capacity includes institutions, communities, human resources, and management systems.

Creating Capability

The Army does not define capability, but Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, defines it as *"the ability to execute a specified course of action."*[7] That definition is not useful in the context of capacity building. A better definition of capability is *the collective employment of resources and skills to achieve a desired outcome*. Resources may include raw materials, funds, offices, building codes, people, automation, and tools. Skills are a person's knowledge or physical ability to execute specific tasks. Understanding the skills needed to create capability and appropriate capabilities to build capacity is the key to capacity building. Capacity cannot be developed directly from skills. To apply a multiechelon approach, one must understand the relationships among resources, skills, capabilities, and capacity.

The figure below is a simplified depiction of the elements of public works capacity in a local government. Available resources, coupled with skills, create the capability. The grouping of several capabilities builds capacity. Here, resources and construction skills create construction capability. The public requirement, construction, and management capabilities build the public works capacity. Skills may not be unique to a capability, and capabilities are not



necessarily unique to capacities, but the figure does not depict this possibility.

For engineers, the need for a host nation to possess public works capacity creates new challenges. Instead of delivering a project or executing a mission in support of a maneuver unit, the engineers must focus resources on improving host-nation skills, capabilities, and capacity. The engineer headquarters must enable capacity building during project execution. An example that illustrates the relationships among skills, capabilities, and capacity may be useful. Suppose that an engineer unit receives the mission to construct a police station. The unit can use its resources, funding, and personnel to execute the mission by purchasing materials for troop construction, or it can attempt to obtain a construction contract. However, while considering a construction contract, the unit determines that there is no host-nation contractor available for, or capable of, executing a construction contract. This lack of civil capacity means the unit must complete the construction mission with its own personnel, but it also presents an opportunity to build host-nation capacity.

Rather than directly executing the project, the unit can seek unemployed local nationals and train them as carpenters, masons, electricians, and plumbers. After a training period, the unit can use the trainees, through on-the-job training, to execute the project. Army engineers provide the drawings, materials, supervision, and coordination with host-nation officials for the actual construction of the police station. Multiple iterations of such activities could result in developing a pool of skilled host-nation workers.

If skilled workers already exist but host-nation construction companies do not, the engineer unit can serve as a general contractor. The unit can build construction capability by hiring the skilled workers and training native personnel as superintendents and quality control managers —thereby teaching future contractors who can bring local skilled workers together for new projects. Potentially, by working with the local government, the unit could train and mentor a local agency in contracting for supplies, workers, and project development and implementation. Such practices lead to building or increasing capability within the host nation. Cumulatively, they can lead to increased capacity within the host-nation government and society.

Responsible government agencies require training or mentoring to develop programs that identify and prioritize requirements for public works such as police stations. Key agency responsibilities include acquiring funding, determining which projects to execute, and managing project execution. When key government agencies can do this in conjunction with sufficient construction and management capabilities, the host nation has increased its capacity. Increasing capacity is a very difficult task to undertake. It is outside the bounds of what an engineer unit would normally attempt, but capacity building is still within the realm of project managers. Field grade leaders can easily identify the requirements and interrelated actions. As a minimum, engineer leaders can conduct the initial assessment and make a proposal for increasing capacity. The point is that engineers can increase skills, capabilities, and capacity while identifying gaps for the host nation and contribute even more significantly to conflict transformation.

The intent of the example on page 19 is to show the relationships among skills, capabilities, and capacity. During my 15 months in Iraq, many people talked of increasing the capacity of the Iraqi security forces, ministries, or provincial governments. What was often missing was a discussion of whether the particular Iraqi elements had the skills and capabilities required to increase their capacity. We usually provided resources and mentoring in the belief that we would build capacity, but too often we missed the mark. If we understand how resources, skills, capabilities, and capacity are related, we can effectively work to improve skills and capabilities, use resources, and build host-nation capacity. Instead of simply executing projects, engineers could be an important participant in the capacity-building process and add significant value to stability operations. This is equally true for theater engagement.

Summary

Again this year in *Cobra Gold*, the United States Army Pacific's annual engagement exercise with Thailand, planners will determine the best project to build based on U.S. training objectives and the needs of the host nation. Rather than looking back over the past 20 years at 20 successful projects, we might better apply a capacity-building framework that focuses on the relationships between resources, skills, capabilities, and capacity building. Then perhaps, 20 years in the future, instead of looking back at deteriorating projects, we could look back at the number of trained, skilled workers; new construction businesses; and innumerable projects planned and coordinated by the regional government and built through host-nation capacity. Such successes would contribute to achieving the U.S. objectives of a stable and vibrant modern nation-state. Such an achievement would be equally viable in Iraq and Afghanistan.

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Endnotes

[1] FM 3-07, *Stability Operations*, 6 October 2008.

[2] FM 3-34, *Engineer Operations*, 2 April 2009, para. 5-34, p. 5-9.

[3] FM 3-34, para. 5-34, p. 5-9.

[4] FM 3-07, para. 2-6, p. 2-2.

[5] Engineer Regulation 5-1-16, *Capacity Development–International*, 30 June 2009.

[6] FM 3-07, p. Glossary-3.

[7] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, p. 74.

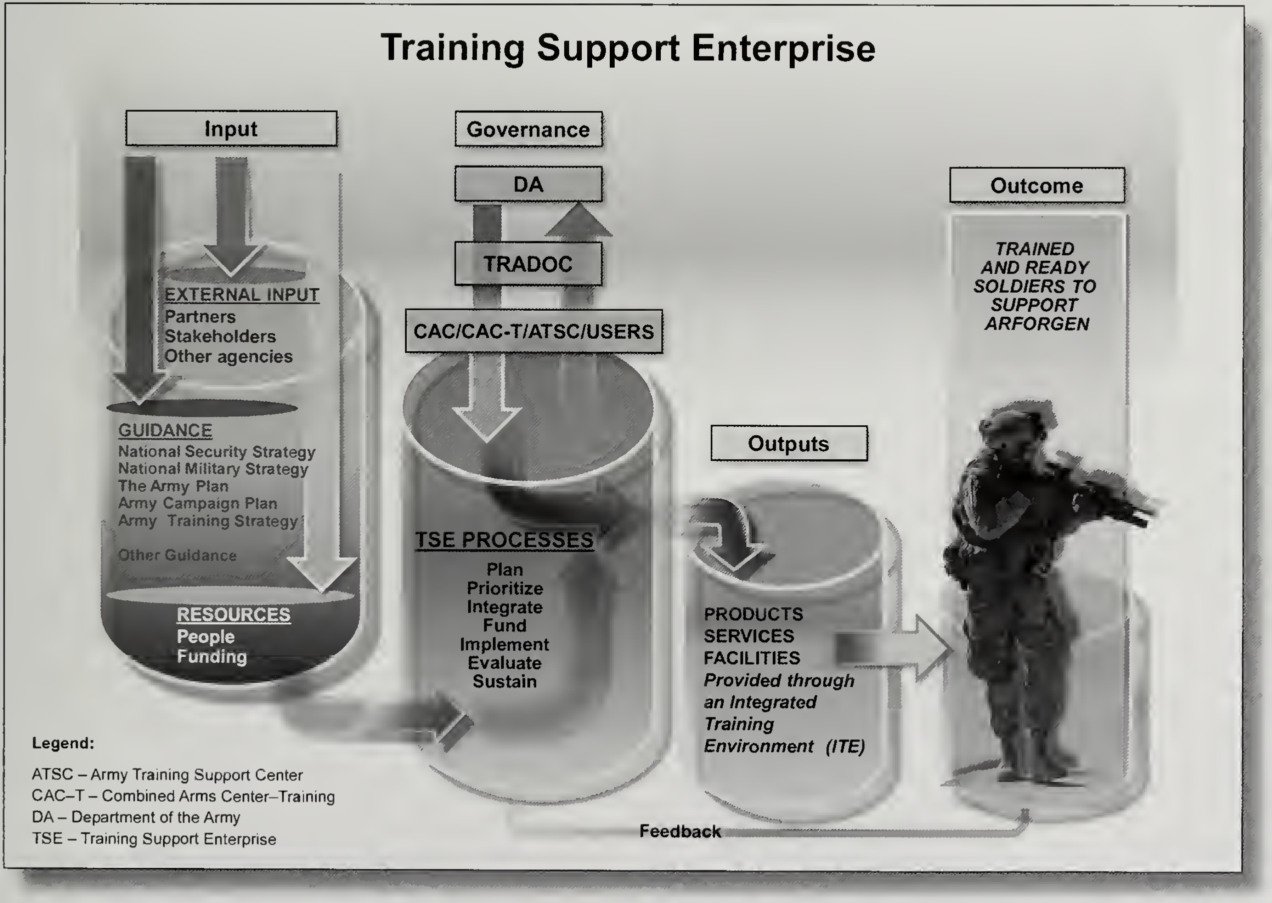
Army Training Support Enterprise: A New Paradigm for Training Support

> *"To be prepared for war is one of the most effective means of preserving peace."*
>
> *—General George Washington*

By Ms. Deborah O. Billups

Since the Revolutionary War, the United States Army has prepared its Soldiers to conduct their wartime missions through extensive training. That training has often required some type of training enablers—whether people, facilities, products, or services—that allow Soldiers to meet the training standard under conditions that closely replicate those encountered during their mission. Today, we refer to those enablers as training support. More specifically, we define *training support* as encompassing the training information infrastructures, products, materiel, personnel, services, and facilities to enable integrated training and education. Training support develops and sustains leader, Soldier, and civilian competencies and enhances unit readiness across the institutional, operational, and self-development training domains in an *integrated training environment*.

While the look and feel of training support has changed significantly because of the continuous and significant advances in technology, the intent—to ensure that Soldiers and civilians have the training enablers necessary to prepare them to accomplish their mission during both war and peace—has not. This becomes increasingly challenging as we continue to operate in complex environments that require innovative training and training support solutions to ensure the success of our Soldiers and civilians, whatever their missions. One of the first steps in ensuring relevant training support solutions is establishing a comprehensive Army Training Support Enterprise that provides relevant


Training Support Enterprise
Input
Governance
DA
TRADOC
CAC/CAC-T/ATSC/USERS
Outcome
TRAINED AND READY SOLDIERS TO SUPPORT ARFORGEN
EXTERNAL INPUT
Partners
Stakeholders
Other agencies
GUIDANCE
National Security Strategy
National Military Strategy
The Army Plan
Army Campaign Plan
Army Training Strategy
Other Guidance
RESOURCES
People
Funding
TSE PROCESSES
Plan
Prioritize
Integrate
Fund
Implement
Evaluate
Sustain
Outputs
PRODUCTS
SERVICES
FACILITIES
Provided through an Integrated Training Environment (ITE)
Feedback
Legend:
ATSC – Army Training Support Center
CAC–T – Combined Arms Center–Training
DA – Department of the Army
TSE – Training Support Enterprise

The complex TSE governance process in achieving the critical outcome—trained and ready Soldiers

training support capabilities responsive to the needs of Soldiers, civilians, leaders, and mission/combatant commanders and ensures Army readiness.

What Is an Enterprise?

Army Regulation 25-1, *Army Knowledge Management and Information Technology*, defines an enterprise as "the highest level in an organization; it includes all missions, tasks, and activities or functions."[1] This definition can be applied to the Training Support Enterprise since it represents the entire organization of training support, including all the processes, actions, and functions necessary to develop and deliver integrated, operationally relevant training support capabilities.

While the Army currently has a Training Support System (TSS) Enterprise, it is limited in scope. It is composed of the Sustainable Range Program (SRP), Integrated Training Area Management (ITAM) Program, Soldier Training Support Program (STSP), Battle Command Training Support Program (BCTSP), and the Combat Training Center (CTC) Modernization Program. These programs are managed collectively and include many training support capabilities—including ranges; instrumentation; training aids, devices, simulators, and simulations (TADSS); services; and personnel.

As broad as the current TSS Enterprise appears to be, it represents only a portion of all the training support capabilities that have grown over the past 10 to 15 years and even those on the horizon. Some of the other programs and their capabilities that should form the Enterprise include, but are not limited to—

- Army Training Information System (ATIS).
- Distributed Learning (dL) products and services.
- Standards in Training Commission (STRAC) for ammunition.
- Training development, delivery, and student management processes and tools.
- Mobile learning and interactive multimedia capabilities.

Although this is not a complete list, it does represent an expanded view of what the Enterprise must encompass to provide comprehensive training support.

Why Do We Need an Expanded Enterprise?

The advance of information technology, the demands of an era of persistent conflict, and the Army Force Generation (ARFORGEN) model have necessitated a change in training support capabilities and how that support is executed—from providing essentially institutional and home-station training support capabilities to mobile, reconfigurable, integrated, and interoperable capabilities to Soldiers and civilians at any time or place. Most of the training support capabilities of today do not have these characteristics.

The capabilities of the existing Enterprise are often developed independently within functional "silos," resulting in training support solutions that are redundant and not interoperable, integrated, or reconfigurable. For example, capabilities for classrooms are developed independently, based on the type of facility—such as a dL Classroom XXI, Digital Training Facility (DTF), or Institutional Battle Command Arts and Sciences Program (I–BCASP) classrooms. While they all serve as classrooms and require networked infrastructures and facility support personnel, they are developed in parallel because they are funded through different programs and their purpose and audience may be different. These training support facilities typically compete for limited resources and do not provide the most efficient responses to current and future force requirements.

Without Training Support Enterprise processes that eliminate stovepipes and enable integration and synchronization of capabilities, we will continue to develop inefficient training support solutions that are not fully responsive to the needs of the customers. Applying the Training Support Enterprise solution to the training facility example should result in the development of fewer facilities at a lower cost with more varied capabilities to support several different purposes and audiences.

How Do We Get There?

The United States Army Training and Doctrine Command (TRADOC) recognizes these shortcomings and has designated the United States Army Combined Arms Center (CAC) to lead the effort to establish a holistic, integrated approach for managing training support through the expanded Training Support Enterprise.

CAC is taking steps to ensure that an expanded Training Support Enterprise becomes a reality. The first key step is educating those involved in training support on the *who, why, what, when, where,* and *how* of the Enterprise. It is conducting meetings and briefings with many of those involved at all levels to describe the Training Support Enterprise, communicate the value added, establish responsibilities, and gain consensus. This effort will encourage leaders to take a holistic view of Training Support Enterprise objectives, processes, and resources and empower them to act cohesively to integrate related training support functions.

Additionally, CAC and others in the training support community have begun working together to define the governance processes critical to ensuring that objectives are achieved, risks are managed appropriately, and resources are used responsibly. The governance processes will provide the means to bring together training support managers and others involved in training support under a single umbrella to collaboratively identify like requirements and opportunities for leveraging capabilities across programs and lines of operation (LOOs). Specifically, the governance processes will—

- Ensure that training support capabilities are linked with approved training strategies.
- Provide a means to holistically identify gaps and eliminate redundancies.

(Continued on page 24)

ARMY RESERVE UPDATE

By Colonel Jose E. Cepeda

These are exciting times to be a United States Army Reserve engineer. The Army Reserve grew as an organization to a record-breaking strength exceeding 208,000. Of that number, more than 16,000 Army Reservists proudly serve the Regiment in 2 theater engineer commands (TECs), 4 engineer brigades, 2 maneuver enhancement brigades (MEBs), and 26 engineer battalions. We comprise 25 percent of the total Army engineer force. Since 2001, the Army Reserve has downsized from 298 to 248 engineer units. Yet, it continues to support the full spectrum of operations from engineer units in 41 states and territories. Since 2002, 94 percent of all Army Reserve engineer units have deployed. Since 11 September 2001, more than 13,000 Army Reserve engineers have answered the call to duty.

We welcomed the return of the 416th TEC's deployable command post (DCP), the 926th Engineer Brigade from Iraq, and the 420th Engineer Brigade from Afghanistan in 2009. The United States Army Engineer School started a new initiative to include all returning engineer brigades in its lessons learned program and dispatched a team to the 926th Engineer Brigade in May 2009 and again in August 2009. In addition, the Engineer School sent an assistance team to the 412th TEC's DCP at Camp Shelby, Mississippi, in August 2009. The 412th TEC's DCP, the 372d Engineer Brigade, and the 411th Engineer Brigade were also preparing for 2009–2010 deployments.

The Army Reserve is riding the winds of change as it transforms from a strategic reserve to an operational reserve. The United States Army Reserve Command (USARC) is moving from Fort McPherson, Georgia, to Fort Bragg, North Carolina; the Office of the Chief of Army Reserves will move from Washington, D.C., to Fort Belvoir, Virginia; and the United States Army Human Resources Command will move from Saint Louis, Missouri, to Fort Knox, Kentucky. The Army Reserve engineer community saw four new commanders at major units in 2009:

- 416th TEC (Major General Paul E. Crandall)
- 411th Engineer Brigade (Brigadier General David L. Weeks)
- 420th Engineer Brigade (Brigadier General James H. Doty Jr.)
- 926th Engineer Brigade (Brigadier General Bud R. Jameson Jr.)

Five Army Reserve engineers—the four officers named above and Brigadier General Eddie Chesnut, deputy commander of the 416th TEC—received general officer promotions.

The commandant and command group of the Engineer School attended many of the major Army Reserve engineer training conferences and exercises throughout the year, including the 416th TEC Senior Leader Conference in April and the 412th TEC Warfighter Conference in June. Major 2009 Army Reserve exercises included Operation Essayons at Fort Hunter Liggett, California, in May; Operation Sand Castle at the National Training Center (NTC) at Fort Irwin, California, in July; and Operation River Assault at Fort Chaffee, Arkansas, in July.

This year, Engineer School personnel will see Army Reserve engineers in action again, including:

- 412th TEC's Operation River Assault at Fort Chaffee, from 10–24 July
- Army Reserve engineer battalion rotations at NTC, from May to August
- Operation Essayons at Fort McCoy, Wisconsin, in July
- Castle Installation-Related Construction at Fort Dix, New Jersey, in July

In 2009, the Engineer School trained more than 2,500 Army Reserve officers, warrant officers, noncommissioned officers (NCOs), and enlisted Soldiers at Fort Leonard Wood, Missouri. This number does not include the 250 mobilized Individual Ready Reserve engineers the school trained. The Army mobilizes four multirole bridge companies per year—two of them Army Reserve units—which are trained and evaluated at Fort Leonard Wood. We have a strong Army Reserve NCO liaison team serving at Fort Leonard Wood to help retain Soldiers. In 2009, they exceeded United States

Army Training and Doctrine Command standards by keeping the Army Reserve attrition rate to a low 3 percent.

The Army Reserve will benefit from increased resident instruction time at Engineer School courses. The Basic Officer Leader Course increased to 17 weeks and, with the addition of the 201A construction engineering technician course, the Basic Warrant Officer Course increased to 26 weeks. We strongly recommend that new brigade and battalion commanders attend our premier course, the Engineer Precommand Course. The Engineer School is considering including new command sergeants major, as well. In addition, the Engineer School hosts an annual engineer Total Army School System trainer workshop and conducts critical skill review boards requiring active Army Reserve participation.

For 2009, the Army Reserve nominated candidates for all appropriate regimental award categories, as outlined in Fort Leonard Wood Pamphlet 672-1, *Itschner and Grizzly Awards, Sturgis Medal*, and *Van Autreve Award*.[1] Army Reserve regimental award nominations are sent to USARC in January and submitted to the Engineer School, and awards are presented at the annual ENFORCE Conference. The 2009 winners were as follows:

- *Itschner Award*: 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri
- *Outstanding Engineer Platoon Leader (Grizzly) Award*: First Lieutenant Christopher G. Smiley, 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri
- *Outstanding Engineer Warrant Officer Award*: Warrant Officer Three Nathan P.D. Harvel, 321st Engineer Detachment, 844th Engineer Battalion, Bethlehem, Georgia
- *Sturgis Medal:* Staff Sergeant Jay L. Kochuga, 336th Engineer Company, 463d Engineer Battalion, Youngwood, Pennsylvania
- *Van Austreve Award*: Specialist Ricky L. Weissend, 375th Engineer Company, 844th Engineer Battalion, Eva, Alabama

It has been a great honor and privilege to serve at the Engineer School. In February, my replacement, Colonel Aaron Walter, became the new Engineer School Deputy Assistant Commandant–Army Reserve. Colonel Walter will help support and carry the Army Reserve engineer community to the next level. Essayons!

Colonel Cepeda was Deputy Assistant Commandant–Army Reserve when he wrote this article.

Endnote

[1] Fort Leonard Wood Pamplet 672-1 was revised on 18 November 2009. The new title is *The Itschner, The Outstanding Engineer Platoon Leader, The Outstanding Engineer Warrant Officer, The Van Autreve, and the Morris Outstanding Civilian Award and the Sturgis Medal.*

("New Paradigm," continued from page 22)

- Establish forecasting, validation, prioritization, and integration criteria for program capabilities.
- Establish metrics that focus on outcomes.
- Synchronize varied processes and schedules with important Army drivers, including resourcing and policy decisions.
- Enable resource-informed decisions at the lowest possible level.
- Provide the analytics to enable rapid decisionmaking by leaders to adjust to mission, technology, and funding changes.
- Establish reporting requirements and processes that provide total asset visibility across the Enterprise.
- Apply knowledge management strategies and applications to enable rapid decisionmaking and identify second- and third-order effects of decisions.

What Are the Challenges?

But even with education and well-defined governance processes, establishing the Training Support Enterprise is a complex process that will not happen overnight. This broad undertaking includes a myriad of challenges that involve developing, delivering, and sustaining relevant training support capabilities. The greatest challenge, however, is change.

Establishing the Enterprise will require extensive systematic and synchronized activity to ensure the most efficient and effective use of limited resources. It will require conscious, deliberate actions by the many players who are committed to ensuring that training support is continuously acquired, managed, maintained, sustained, and disposed of in the most effective and efficient manner possible. Additionally, it will require leadership commitment, guidance, and support to ensure that those involved in the Enterprise judiciously execute their responsibilities.

What is the End Result?

With everyone working together, the end result will be a Training Support Enterprise that distributes available resources to achieve the optimal balance between effectiveness, efficiency, and strategic risk. It represents a new paradigm for training support to better enable Army readiness and respond to the needs of Soldiers, civilians, and leaders anytime, anywhere.

Ms. Billups is a concepts and plans specialist at the Combined Arms Center–Training, Army Training Support Center, Fort Eustis, Virginia. She holds a master's in education from Old Dominion University.

Endnote

[1] AR 25-1, *Army Knowledge Management and Information Technology*, 4 December 2008, p. 120.

Multitasking Under Fire

By Captain Daniel J. Lucitt

It is ironic that as the United States Army focuses on the modularity of its force, one unit strived for and succeeded in forming a legacy-type force. The effort was based on the needs of the current fight and the results could only be accomplished through flexibility. This commonsense determination was due to the foresight of the leaders of the 40th Engineer Battalion and the 2d Brigade Combat Team (BCT) of the 1st Armored Division, home-stationed in Baumholder, Germany. This article is not an argument for a return to the earlier structure of fighting force, but it serves as a good example of Army small-unit flexibility and versatility.

Assuming command, breaking apart task organization, retraining for a new mission under the parent battalion, and moving into a different operational environment were the jobs on the first quarter calendar of events for Charlie Company, 40th Engineer Battalion. The Army has come to a point where that kind of flexibility is the norm. Four or five years ago, flexibility was a buzzword that fit cleverly into every canned set of talking points. Now, flexibility—coupled with determination—is at the heart of the Army culture. Whether it's a field artillery battery that retrains to serve in a military police capacity or the Soldiers of an engineer platoon who serve as civil affairs escorts, the Army has come to employ all forms of flexibility effectively.

In October 2008, Charlie Company was to conduct a change of command while deployed in Baghdad, Iraq. Normally this is a run-of-the-mill activity, even while deployed. However, it was the fifth company-level change of command for the BCT in as many months. The only obstacle to the obligatory change-of-command inventories was the task organization of each of the company's platoons to different maneuver battalions organic to the 2d BCT. What made the inventories especially challenging was that the platoons

Third Platoon conducts an interrogation.

were located at different combat outposts and forward operating bases (FOBs).

Then the 2d BCT took control of the operational environment held by the 3d Brigade, 101st Airborne Division, nearly doubling the BCT's area of operations (AO). With this expansion, a second company of engineers would be needed to conduct route clearance throughout the gained area. Therefore, the battalion commander requested permission to reconstitute Charlie Company to accomplish the route clearance missions in the newly acquired AO. The 40th, a legacy engineer battalion, by now looked more like a special troops battalion. It had an engineer company assigned, while two others—Alpha and Charlie—were tasked to maneuver units. The battalion had administrative control of Signal Corps and Military Intelligence Corps companies, the required Headquarters and Headquarters Company, and administrative and logistics support of the brigade headquarters company.

Charlie Company was reconstituted at FOB Hammer to start company-level combat operations. In quick succession, the company had change-of-command and relief-in-place/transfer-of-authority ceremonies. Then the leaders turned their attention to retraining sappers who had previously been trained in route clearance but had performed other duties during the deployment thus far. The training plan included a "right-seat, left-seat" ride with the battalion's Bravo Company. It was determined that the retraining would take place before conducting the change-of-command inventories.

The focus of the training plan was to ensure that the noncommissioned officers (NCOs) were directly responsible for all training in their platoons. Three of the four platoon sergeants were explosive ordnance clearance agent (EOCA)-qualified and a select few squad leaders had attended one of the two available Route Reconnaissance and Clearance Courses. Responsibility for the training rested squarely on the shoulders of these leaders, who would perform the missions with the Soldiers.

The Soldiers needed to reinforce the basics of their route clearance skills and the fundamentally sound practices they had used throughout previous deployments. Theater-level Iron Claw Academy route clearance training[1] was offered to the company, but the leaders opted to trust the company's NCOs to pass along the training they had already received to bring the company together with a common mission. The plan worked, and within a few short missions the Soldiers were recording finds and reducing explosive hazards on the routes they patrolled, greatly reducing the risk to U.S. and coalition forces.

Route clearance operations and refresher training became the top priorities as Charlie Company continued its transition with Bravo Company, hindering the change-of-command inventory schedule. Training was scheduled to allow each platoon a day to refit, permitting time to conduct inventories and prepare for the next day's mission. This illustrated the old maxim that the mission comes first. The company's supply team members were recognized by the commander of Multinational Division–Center for their

Second Platoon's TALON robot (center) returns after emplacing C-4 on a positive find.

Charlie Company Soldiers follow as their Iraqi partners take the lead on a route clearance patrol.

efforts to ensure that inventories ran as smoothly as possible.

As the company reorganized for its new mission, a need developed for route clearance in the AO of 4th Battalion, 27th Field Artillery. This required a movement of forces from FOB Hammer to Camp Stryker. The need for a platoon to begin route clearance operations was a major forcing factor in moving the command post, additional engineer equipment, and containers. For the second time in the deployment, the company began decentralized operations in support of the BCT. The size of the company and the flexibility of each of its platoons ensured a seamless transition into the unit's new AO. The company was able to conduct route clearance operations independently within days of arriving, well before the rest of the BCT was established in its new home at Camp Stryker.

The entire company moved to Camp Stryker from FOB Hammer within 10 days, and the relief in place began before the company was fully reestablished. Due to the extensive equipment drawn during the relief in place—and throughout the remainder of the deployment—Charlie Company had a complement of more than 70 vehicles. Soon the unit assumed responsibility for the famed Route Tampa, a main supply route (MSR) for U.S. and coalition forces in Iraq. Although Charlie Company only "owned" a relatively small section of Route Tampa, the company took complete control of it. It also became the only route clearance company in-theater to clear Route Tampa and also have partnerships with the Iraqi Army and Iraqi Police. In addition to its route clearance missions along MSR Tampa, Charlie Company also was responsible for conducting route clearance for two more units, effectively doubling its mission load and operational tempo.

As a postscript to this multifaceted transition, Charlie Company maintained a partnership with Iraqi forces throughout the deployment, cleared Route Tampa several days a week, and cleared routes on the interior of its own brigade's footprint. At tour's end, the company had participated in five named operations, cleared more than 30,000 kilometers, and interrogated 335 explosive hazards. Those numbers read well for an entire tour, but the fact is that Charlie Company accumulated those numbers in just seven months and did it without fatalities.

In conclusion, the first quarter of fiscal year 2009 proved to many in the 2d BCT that the unsung efforts of just over one hundred sappers could accomplish Herculean feats. The facts are simple; in less than 30 days, the Soldiers went from a daily operational role with one set of missions to a daily operational role with a completely different mission set. The transition took place under fire during a change in leadership, with all the inventory requirements that such a change entails. At a time when leaders liken changing the Army's structure to steering an aircraft carrier and compare its efforts to a marathon rather than a sprint, a few dedicated engineers exemplified just the opposite. Those efforts proved vital and timely.

Captain Lucitt is Commander, Charlie Company, 40th Engineer Battalion. Commissioned in 2001, he has a bachelor's and is working on a master's in geospatial engineering. His previous assignments include the 1st Cavalry Division and 2d Brigade, 75th Infantry Division. He is a graduate of the Infantry Captains Career Course.

Endnotes

[1] Captain Scott F. Swilley, "Iron Claw Academy: Developing Route Clearance Capabilities in the Iraqi National Police," *Engineer Professional Bulletin*, Volume 38, July–December 2008, pp. 56–58.

The Brigade Engineer

By Major Gerald S. Law

This article compares the increased engineer cell duties for brigade combat teams (BCTs) conducting operations at Forward Operating Base (FOB) Fenty, Afghanistan, to engineer duties at Fort Carson, Colorado, and the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana. It also presents lessons learned for brigade engineers and units deploying to Afghanistan. It is not a manning discussion, nor does it propose manning adjustments.

In May 2009, 4th BCT, 4th Infantry Division, deployed from Fort Carson to Afghanistan in support of Operation Enduring Freedom. By late June, the BCT had assumed responsibility for Nangarhar, Nuristan, Kunar, and Laghman (N2KL) provinces, which cover more than 25,250 square kilometers in the eastern portion of Afghanistan. Furthermore, the region contains several Taliban-contested routes along the Afghanistan–Pakistan border, with mountainous terrain encompassing peaks more than 15,000 feet high; narrow, steep valleys; and the strategically important Torkham Gate.

Unlike previous deployments in Iraq, the BCT's mission in Afghanistan required deployment to more than 30 FOBs, combat outposts (COPs), and observation posts throughout N2KL, in elements ranging from squad to battalion size. FOB Fenty, the brigade tactical operations center, is in the city of Jalalabad, in the southern portion of the brigade's area of operations. Here, the BCT engineer cell assumed the engineer duties and responsibilities from the departing unit and began operations. Soon the engineer cell discovered it was overwhelmed and seriously undermanned.

Afghan workers construct a guard tower at a forward operating base.

Local nationals build a stone wall at a U.S. base.

Duties and Responsibilities

The brigade engineer coordinates "the use of engineer and other organic or augmenting assets to conduct combat (mobility, countermobility, and survivability), general, and geospatial engineering support to the BCT," according to Field Manual (FM) 3-90.6, *The Brigade Combat Team*. Simply, the brigade engineer is responsible for all engineer operations occurring within the brigade's area of operations. The responsibilities are the same whether the brigade is at its home station, a training center, or on a deployment. However, the duties can vary greatly. For example, FM 3-90.6 lists 11 duties for brigade engineers, but depending on the location—Fort Carson, JRTC, or FOB Fenty—they may not perform them all.

Fort Carson

The brigade engineer cell was virtually nonexistent at Fort Carson. The BCT was not directly responsible for the construction of its facilities, and there was no requirement to design, contract, approve, or fund the facilities within the BCT's footprint. A brigade engineer cell was not needed to track large-scale construction projects or enablers. Furthermore, there was no requirement to track improvised explosive devices (IEDs) or route clearance packages (RCPs) at Fort Carson. Therefore, the BCT decided an engineer cell was not needed and used the brigade engineer as the future operations (FUOPS) planner.

JRTC

The brigade engineer cell required minimal manning during its JRTC rotation. The BCT conducted an intensive and demanding training rotation at Fort Polk, but again, it was not responsible for the construction and expansion of its FOBs and COPs. No requirement existed for the brigade engineer or engineer cell to design, contract, fund, or track the facilities where the BCT operated. The major requirement for the engineer cell during the rotation was IED and RCP tracking, which BCT leaders decided could be performed by the assistant brigade engineer. IED and RCP tracking is a critical and important task, but it can be performed by one or two Soldiers. Therefore, JRTC operations required just one or two personnel in the brigade engineer cell with the brigade engineer again functioning as the brigade FUOPS planner.

FOB Fenty

Operations in Afghanistan require a dedicated brigade engineer and engineer cell. The owner of the area of operations is responsible for the construction, deconstruction, and expansion of its FOBs and COPs in Afghanistan. The United States Army Corps of Engineers (USACE), local and government contractors, facilities engineering teams, and division/corps engineers are not responsible for the brigade's construction. They are only enablers who have to be managed by the brigade. Therefore, the brigade engineer and engineer cell coordinate, contract, fund, and track the enablers to ensure that FOB/COP construction and/or expansion operations are properly planned and executed.

Upon arrival, the brigade engineer assumed responsibility for more than 130 major construction projects occurring within the brigade's area of operations, not counting the Commander's Emergency Response Program (CERP) or USACE projects already under construction. Construction requirements increased significantly. Furthermore, the brigade engineer must coordinate and track the IEDs occurring and the RCPs operating within the BCT area of operations. Therefore, a dedicated brigade engineer and engineer cell are required during deployment.

Recommended Personnel

The following list describes the recommended personnel and associated duties found in the brigade engineer cell while conducting operations in Afghanistan:

Brigade Engineer (officer in charge of engineer cell)

- Provides engineer input for warning orders (WARNOs), fragmentary orders (FRAGOs), operations orders (OPORDs), movement orders, and deployment orders. Responsible for BCT engineer operations within N2KL.
- Informs division of all BCT engineer operations, to include FOB/COP construction, deconstruction, expansion, and RCP clearance and status.
- Coordinates RCP operations. Develops the RCP clearance schedule and ensures that it meets the BCT commander's intent. Tracks all RCP equipment, manning, and training, and keeps the BCT commander informed on all RCP issues.
- Coordinates with the BCT counter-IED cell. Advises the cell on all RCP operations and receives and implements advice for future RCP operations.

Assistant Brigade Engineer (engineer cell construction manager)

- Acts as FOB/COP construction manager. Ensures that Joint Funds Utilization Board (JFUB) packets from subordinate battalions are complete, accurate, and suitable. Ensures that purchase requests and commitments are completed and signed by the appropriate personnel. Provides design solutions and alternatives to battalion engineers.
- Acts as construction project approval and funding representative. Ensures that projects are loaded into the Project Information Management Portal. Collects all JFUB requirements from battalion engineers, prioritizes projects based on BCT commander's guidance, and presents the BCT projects to the JFUB for approval.

Logistics Civil Augmentation Program Coordinator

- Acts as Logistics Civil Augmentation Program (LOGCAP) manager. Processes LOGCAP requests from the battalions; assembles packets; ensures that the letter of justification is signed; submits a draft letter of endorsement to the logistical support officer and sends it to BCT supply (S-4) and contracting offices; and tracks all LOGCAP requests, work orders, and contractors.
- Manages Class IV supply items. Reviews all Class IV requests for justification and completeness and submits packets to the BCT S-4 for processing.
- Coordinates U.S. contractor affairs. Develops project list for contractor teams, coordinates contractor movement to FOBs and COPs within the BCT area of operations, and coordinates contractor bill of materials requests.

Environmental Engineer Representative

- Recommends improvements to the health and welfare of Soldiers living within the BCT area of operations and recommends environmentally friendly actions for coalition forces.
- Provides input to engineer plans, WARNOs, OPORDs, FRAGOs, movement orders, and deployment orders; advises the brigade engineer on all environmental issues.

Additional Personnel

Statement of Work Writer

- Assists the engineer cell construction manager with writing approved statements of work for construction packets.

Contingency Real Estate Support Team Agent

- Helps the engineer cell legally obtain land for FOB, COP, and observation post construction and expansion. Legally enters into contracts on behalf of the Army to pay for land obtained from local nationals.

Lessons Learned

The following list describes lessons learned for brigade engineers and units deploying to Afghanistan:

Go on the Predeployment Site Survey. The predeployment site survey (PDSS) will help you become familiar with your counterpart's duties and responsibilities several months before deployment. This allows you to validate your training plan at home station, which prepares you for assuming the brigade engineer duties once in-theater.

Inform the Command Group. Ensure that the command group, or at least the BCT operations (S-3) officer, understands before the deployment what the brigade engineer's role and responsibilities are. Ensure that the S-3 understands what the engineer requirements are at home station, training centers, and during deployment. Don't let it be a surprise that you will not be the FUOPS planner once you hit the ground.

Study the Army Theater Construction Management System. Initially, this should occur on the PDSS and later, during personal research. There are mainly four different types of construction within the BCT area of operations—B-huts, Southeast Asia huts (SEAhuts), and

Afghan workers constructed these B-huts at a combat outpost.

one- and two-story brick-and-mortar structures. Learning the types of construction, the cost of each, and construction timelines before arrival will save time during the turnover of responsibilities. The BCT commander won't care if you majored in political science. You wear the castles; you're the engineer. He will expect you to know the basic in-theater construction and how to manage and track it.

Learn the Army LOGCAP process. LOGCAP augments maneuver enhancement forces with civilian contractors. There are many enablers to help with in-theater construction. The brigade engineer must understand how they are managed, funded, and tracked. Refer to Army Regulation 700-137, *Logistics Civil Augmentation Program* (LOGCAP), for LOGCAP processes and objectives.

Emplace an Engineer Chain of Command Within the BCT. N2KL averaged more than 130 construction projects on 35 different FOBs, COPs, and observation posts. This does not count work orders, CERP projects, or USACE projects. Additionally, the engineer cell received hundreds of e-mails from each battalion requesting construction, improvement, and/or expansion. This overwhelmed the engineer cell on a daily basis. To overcome this, the brigade engineer requested that all battalions designate a "battalion engineer" who could prioritize construction requests, turn in basic designs, track construction at the battalion level, and send reports to the brigade engineer.

Know the Duties and Responsibilities of the Brigade Engineer. Learn what is listed in FM 3-90.6. Your command group will use this as a reference. You may or may not perform the duties at home station, but you will during deployment.

Conclusion

The brigade engineer's responsibilities are the same regardless of location; however, the duties can differ greatly. At home station, the BCT is not directly responsible for the construction, deconstruction, and/or expansion of its facilities, COPs, and FOBs. Furthermore, there is no requirement to track IEDs and RCPs on an hourly basis at home station. This leads many BCTs to reduce or eliminate their engineer cells entirely and form them into a planning or training cell.

Training centers implement a requirement to track IEDs and RCPs throughout a BCT training rotation, but a requirement to implement construction enablers and manage them does not exist. For example, BCTs are not required to construct, deconstruct, or expand the COPs and FOBs where they operate during training. Many BCTs establish a small engineer cell to track IEDs and RCPs; however, this does not accurately portray the BCT construction requirements associated with conducting operations in-theater.

The BCT requires a dedicated brigade engineer and engineer cell while conducting counterinsurgency (offensive, defensive, and stability) operations in Afghanistan. Construction, a major component of stability operations, occurs on a large scale in support of coalition forces and local nationals. While the BCT is deployed, there are many agencies available to design, contract, and fund construction projects; however, the BCT is responsible for managing enablers and tracking projects. Therefore, the brigade engineer has a demanding and important responsibility to fulfill while the BCT is deployed, which requires a dedicated engineer cell able to coordinate numerous construction projects, track IEDs, and manage RCPs.

Major Law is the brigade engineer for 4th Brigade, 4th Infantry Division. Past assignments include detachment commander and battalion operations officer with 3d Battalion, 61st Engineer Regiment, 5th Armored Brigade (Training Support Brigade), First Army; assistant brigade engineer, company commander, 44th Engineer Battalion, 2d Infantry Division; platoon leader, 618th Light Equipment Engineer Company, 82d Airborne Division; and platoon leader and assistant brigade engineer, 307th Engineer Battalion, 82d Airborne Division. He holds an associate's in welding engineering from Ricks College; a bachelor's in industrial engineering from Utah State University; a master's in geology and geophysics from the University of Missouri-Rolla (now Missouri University of Science and Technology); and a master's of military arts and sciences from the United States Army Command and General Staff College.

NATIONAL GUARD SOLAR POWER PROJECTS

By Dr. JoAnne Castagna

President Barack Obama said during his inauguration speech on 20 January 2009, "We will harness the sun and the winds and the soil to fuel our cars and run our factories." Mr. Obama and the new administration believe that renewable energy is part of our nation's successful future, possibly because the federal government has already experienced positive results in this area. Under the federal government's Energy Policy Act of 2005, all federal government agencies are required to use some renewable energy. One agency that is continuing to do this successfully is the United States Army National Guard, with the assistance of the United States Army Corps of Engineers (USACE).

Recently the New Jersey Army National Guard sought the expertise of the USACE New York District for construction of two solar power projects. These projects will not only help the Guard meet the country's energy laws but also save money on electricity and earn a profit from the state of New Jersey, which requires its citizens to support the use of renewable energy. Each year, solar system owners who generate more than 1,000 kilowatts of electricity that is connected to the public power grid receive certificates under the New Jersey Solar Renewable Energy Certificate (SREC) Program. These certificates are then publicly sold and traded to New Jersey businesses and individuals, enabling them to receive solar power benefits without building a solar power system themselves. The revenue is returned to the solar system owners.

The New Jersey National Guard is an owner of several solar power systems. They will continue to benefit from the SREC Program with the assistance of USACE, which is constructing two open-panel photovoltaic carport solar

Photo by Armando Jimenez, U.S. Army Corps of Engineer, New York District.

An example of solar power panels on a photovoltaic carport project at the Atlantic City Utility Authority in New Jersey (not constructed by USACE)

power projects for the New Jersey National Guard—one for their agency's Joint Forces Headquarters at Fort Dix and the other for their National Training Facility Headquarters at Sea Girt. To power these two buildings, USACE is erecting the carport structures over two existing parking lots at both locations and then setting up area lighting, inverters, transformers, switchgears, and electrical metering equipment. When the projects are completed, USACE will restore the parking lot pavement (which is already in good shape) by restripping and sealing cracks.

Supported by web steel joists and joist girders, the steel carport structures will have solar photovoltaic power panels—composed of modules—installed on top. Each module is made up of several solar (or photovoltaic) cells that absorb the sun's light and produce electricity—the larger panels producing more. The electricity is in the form of direct current (DC), which is not directly usable energy for a building. Most buildings require alternating current (AC) at a higher voltage. To make usable building power, the solar panel's DC is fed into an inverter that transforms it into AC at a higher voltage. This AC power is then sent to the building's main transformers, where it can be used by the buildings for their energy needs. The New Jersey National Guard's solar power system is tied into the public's power grid, and excess power is shared with the community.

When completed, both structures—including the panels—will be roughly the size of a football field. The Fort Dix project will generate approximately 240 kilowatts, and the Sea Girt project, approximately 238 kilowatts. Both projects are also being designed in a way that will provide the National Guard considerable energy savings during the high-energy-demand months of summertime. At Fort Dix, the panels are being angled for optimum performance. This will provide the Fort Dix building 40 percent of its summer energy needs and the Sea Girt building will provide 80 percent. Placing the panels on an angle also facilitates runoff of rain and snow.

The New Jersey National Guard will earn considerable money from electric bill savings and the state's SREC Program. In total, the Guard will save approximately $116,000 per year in electric bills and earn approximately $350,000 from the SREC Program. Besides these financial benefits, there are additional pluses that come with constructing solar power projects on new open-panel carports on existing parking lots.

Anyone installing a solar power system on an existing building roof, rather than a new roof, will typically have to remove the panels later to repair the roof as it gets old and leaks, which can be very expensive and time-consuming. The solar power system will also add weight or roof load to the existing roof, increasing its deterioration. As the project manager for the USACE New York District emphasizes, a roof may only have one year left, making it impractical to install panels atop it that can last 20 to 25 years. Additionally, placing panels on new roofs makes it unnecessary to acquire building or roofing permits to reinstall roof-mounted solar power systems.

Constructing on existing parking lots also has its benefits. For example, since storm water runoff isn't affected, there are minimal impacts to the environment. In addition, vehicles using the parking lot receive some shading from the sun. An open-panel carport design, as opposed to a solid ceiling structure, is a smart solution, since it prevents debris such as bird nests and snow from accumulating on the carport—which would require regular maintenance. In addition, a solid ceiling adds weight to the structure, requiring a stronger and more expensive structural support.

The project manager for the USACE New York District envisions an increase in solar power project construction and has the following suggestions for builders:

- Before begining a solar power project, seek advice from experts in solar and renewable energy, because they can help save considerable time and money. In the projects highlighted here, the USACE New York District collaborated with the USACE Engineer Research and Development Center, which has extensive experience working on solar power projects with USACE districts, the Department of Defense, and other federal agencies throughout the world.
- When designing a project, make sure the buildings to be provided with solar power are large enough to use most of the energy, or have a "big load," and are situated near the solar power panels. The farther a building is from the panels, the more energy it will take to transport the solar power energy to the buildings, resulting in lost efficiency. For example, solar power panels far out in a desert are impracticable; energy is always wasted when transporting power, since power transmission lines have inherent resistance and capacitance.
- Calculate ahead of time how much money customers will be saving in electric bills in the long run and find out if there are any energy credit programs they can benefit from, such as the state of New Jersey's SREC Program, so that the project is economically justified.

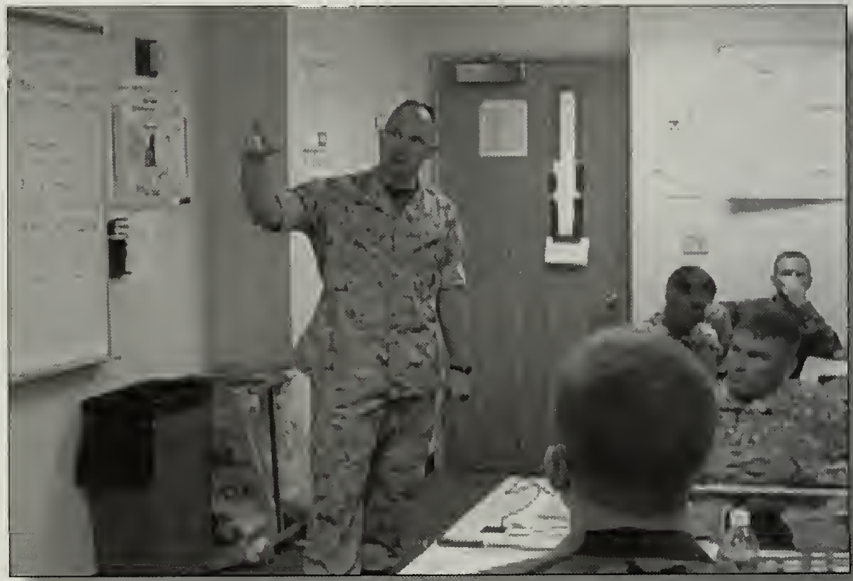
Both solar power projects are expected to be completed by this summer, and according to the New York District project manager, the New Jersey Army National Guard has asked USACE to perform additional solar power projects in the near future—all of which will help meet the nation's environmental goals and the President's renewable energy vision.

Dr. Castagna is a technical writer-editor for the United States Army Corps of Engineers, New York District, and can be reached at <joanne.castagna@usace.army.mil>.

JOINT ENGINEER OPERATIONS COURSE

By Lieutenant Colonel Shawn P. Howley (Retired) and Mr. Michael A. Dascanio

Today, the United States enjoys an overwhelming qualitative advantage not only in our fielded capabilities but also in our cognitive approach to our duties; sustaining and increasing this advantage will require a transformation achieved by combining technology, intellect, and cultural changes across the joint community.[1] Professional military education—Service and joint—is the critical element in officer development and the foundation of a joint learning continuum which ensures that U.S. armed forces are intrinsically learning organizations.[2] The Joint Engineer Operations Course (JEOC) will soon be recognized as a key joint professional military education Phase I (JPME–I) course for engineers.



A small-group leader conducts a class during the JEOC.

Course Description

The JEOC has two parts: a high-end Distributed Learning (dL) Phase and a Resident Phase of instruction designed to prepare selected engineer officers, noncommissioned officers, and government civilians for duty on a joint staff in support of the joint task force (JTF) engineer and joint force commander. Successful completion of the dL Phase is a prerequisite for Resident Phase attendance. It is a 48-hour, self-paced course that can also be incorporated as a standalone self-development course.

Distributed Learning Phase

The dL phase is composed of eight modules:[3]

- United States National Strategy
- Joint Operational Planning
- Joint Engineer Capabilities
- Joint Task Force Engineer Organization
- Theater Engineer Operations
- Transition Planning and Considerations
- Environmental Considerations
- Resident Phase Read-ahead Packet

To enroll in the course, students must first have an active Army Knowledge Online (AKO) or Defense Knowledge Online (DKO) account. Once an AKO/DKO account is established, students should contact course administrator Mr. Dwayne Boeres at <*dwayne.boeres@us.army.mil*> to process their enrollment.

Resident Phase

The Resident Phase is a rotational training course conducted at the United States Marine Corps Engineer School, Quantico, Virginia; the United States Army Engineer School, Fort Leonard Wood, Missouri; the United States Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio; and the United States Navy Civil Engineer Corps Officer School, Port Hueneme, California. The course consists of five days of large- and small-group, facilitator-led instruction with a common operational scenario that parallels the training offered at the Joint Forces Service College. The Resident Phase has multiple seminar and video teleconference discussions between students and deployed joint engineer staffs. The table highlights the dates and locations for the resident courses. The objectives of the Resident Phase are to give students the ability to—

- Describe joint operations, joint warfare, and the joint planning system.
- Describe, comprehend, and apply joint engineer doctrine.
- Describe, comprehend, and apply joint engineer planning using scenarios, historical examples, case studies, and practical exercises.
- Describe and comprehend Service engineer capabilities and support requirements.

- Describe, comprehend, and apply the strengths, effects, and basic doctrinal employment concepts of concepts of Service engineers.
- Describe, comprehend, and apply employment principles for using Service engineer capabilities to support joint and Service engineer requirements.[4]

Resident seating priority is based on the needs of the Service to educate and train joint staff engineer personnel. Potential resident students are divided into three bands, depending on their status and probability of participation with a JTF engineer staff:

- *Band 1.* Personnel assigned to a JTF, combatant command, or component command.
- *Band 2.* Personnel with a high probability of being tasked to help stand up a JTF.
- *Band 3.* Captains preparing to join a prospective JTF headquarters, and all others who would benefit from the JEOC.

JEOC Rotational Course Schedule

Fiscal Year 2010	Location	Fiscal Year 2011	Location
2–6 Nov	United States Marine Corps University— Quantico, Virginia	1–5 Nov	United States Marine Corps University— Quantico, Virginia
12–16 Apr	United States Army Engineer School— Fort Leonard Wood, Missouri	11–15 April	United States Army Engineer School— Fort Leonard Wood, Missouri
14–18 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio	13–17 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio
26–30 July	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California	25–29 July	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California

Course Review

In February 2010, the JEOC underwent a course review at the United States Joint Forces Command (USJFCOM), supported by engineer staff representatives from regional and functional combatant commands. The course review was also supported by the education and individual training programs of USJFCOM's Joint Training Directorate (J-7) and Joint Warfighting Center; Joint Knowledge Development and Distribution Capability; and Operations, Plans, Logistics, and Engineering Directorate (J-3/4).

The purpose of the course review was to improve its currency and relevancy through feedback from the joint engineer community. The review enabled the JEOC training development team to refine the course so it could be entered in the Army Training Requirements and Resource System (ATRRS) and meet the USJFCOM J-7 joint certification criteria to validate the JEOC as a course for JPME–I. The JEOC training development team is considering adjustments to the dL Phase to improve the course's joint education material.

The Way Ahead

The JEOC is a joint logistics staff initiative directed through the Joint Operational Engineer Board, and the course and course management team are hosted by the United States Army Engineer School.[5] More than 500 students have graduated from this course for the joint force and an additional 160 will graduate this fiscal year. Key to the long-term success of the JEOC is establishing formal requirements funding for the course from the Services to the Army through the United States Army Training and Doctrine Command's Training Requirements Analysis System and the Joint Individual Learning Content Certification[6] processes and maintaining currency through feedback from the joint engineer community. To become a member of our adjunct faculty to facilitate a Resident Phase, contact Mr. Shawn Howley at <*shawn-howley@us.army.mil*>; 573-563-5088; or DSN 676-5088.

Lieutenant Colonel Howley (Retired) recently assumed duties as the JEOC program and course manager. He has worked in leadership and organizational development for Army units for more than 20 years.

Mr. Dascanio is a lieutenant colonel in the United States Army Reserve. He serves as the technical director of Training and Leader Development, United States Army Engineer School at Fort Leonard Wood, Missouri.

Endnotes

[1] Chairman of the Joint Chiefs of Staff Notice 1800.01, 15 July 2009, <*http://www.dtic.mil/doctrine/education/edu_ojpme.htm*>.

[2] Ibid.

[3] Joint Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities Change Recommendation Document, 3 October 2008, pp. 5–7.

[4] Ibid, p. 9.

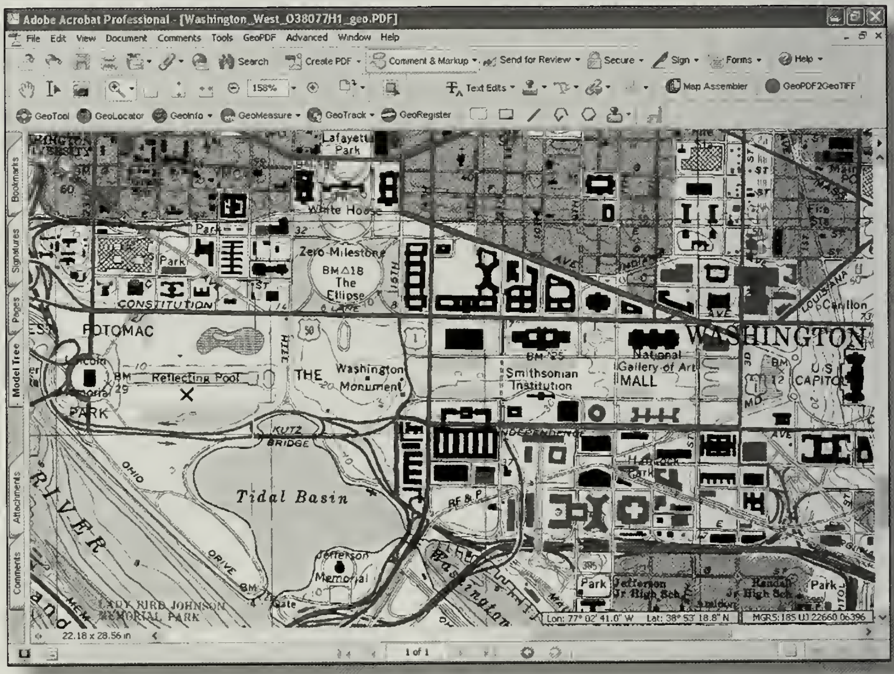
[5] Joint Engineer Operations Course Memorandum of Understanding, September 2008.

[6] Chairman of the Joint Chiefs of Staff Manual 3500.03B, 31 August 2007.

The GeoPDF Project:
Creating Maps for the Non-Mapper

By Mr. Raymond G. Caputo

Organizations that use geospatial data have valuable information locked inside complex applications that only a small number of professionals understand and know how to use effectively. This poses a significant challenge to those attempting to transfer this information to less-skilled end users. United States Army operational and humanitarian missions rely heavily on such data, but many of its Soldiers do not have the time, training, or resources to translate it into actionable information. The United States Army Geospatial Center (AGC) (formerly known as the Topographic Engineering Center), Alexandria, Virginia, discovered and embraced an innovative means of converting complex, intricate National Geospatial–Intelligence Agency (NGA) and United States Geological Survey (USGS) geospatial information system (GIS) and map data into the portable document format (PDF) developed by Adobe® that lets users understand and exploit data without requiring advanced training in GIS applications.



A GeoPDF of the National Mall in Washington, D.C.

Easy Map Sharing

The Georeferenced PDF (GeoPDF), developed by TerraGo® Technologies, lets GIS professionals share georeferenced maps and data in PDF documents. A GeoPDF can be sent to field personnel from engineers on the scene of natural disasters such as Hurricane Katrina or to Soldiers in the field who can use Adobe Reader® to manipulate maps. Most computers are equipped with Reader as part of their baseline software, and each Army geospatial engineering team has the full assortment of TerraGo tools to produce mission-specific products as GeoPDFs. A free, user-friendly plug-in from TerraGo, known as the TerraGo Desktop, is the only requirement to view GeoPDFs. This plug-in has been added to the Army Golden Master disk, the standard software load for Army desktops and servers. Files are small and nimble, yet are embedded with powerful capabilities that allow engineers to work in connected or disconnected modes.

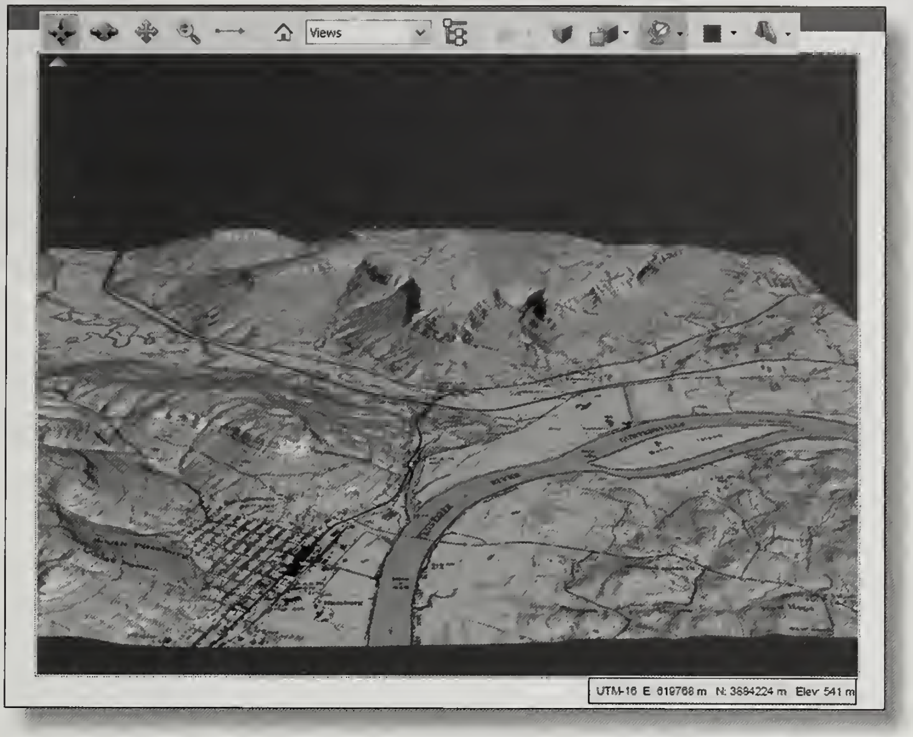
Both types of GeoPDFs, raster and vector, provide a scalable display of the digital map or image with crisp, clear delineation of roads, rivers, contour lines, and other features as the user zooms in for a closer look. The raster files are composed of paper maps that are scanned or developed from existing electronic map files saved as PDFs and georeferenced using the TerraGo Composer® solution. The vector files have an added function that enables users to turn data layers on or off to help clarify analysis of map displays. The use of TerraGo applications for GIS software, such as ArcGIS™ and Intergraph GeoMedia®, creates these vector GeoPDFs.

AGC created GeoPDF digital versatile discs (DVDs) for most countries of the world through its partnership with the NGA Research Center, which has produced GeoPDFs of most of its standard map sheets. AGC distributes these files, but is working on an agreement with NGA to produce, maintain, replicate, and disseminate them via the Defense Logistics Agency's map catalog. The center will continue to use Army resources to create new and updated NGA map sheets as GeoPDFs until this goal is accomplished. Updated DVDs are expected to be made available by fall 2010. For copies of GeoPDF country DVDs, go to <*http://www.agc.army.mil/cmb/index.html*> for the "Data request form." To see the GeoPDF map data that is the basis for the DVDs, go to <*https://cac.agc.army.mil/Products/MapArchive/*>

(common access card [CAC] required). AGC will create GeoPDF DVDs for all 50 states and work with USGS to maintain, replicate, and disseminate them.

Aiding Other Soldier Needs

While working with the Army geospatial engineering team, AGC personnel realized that GeoPDFs could address other facets of Soldier mapping efforts, including the creation of map backgrounds. This could be accomplished if more mainstream GIS software could read and write GeoPDFs and multiple sheets could be combined into a map background. Therefore, AGC funded the creation of a software application called TerraGo Map Assembler®, which is included in TerraGo Composer®, and the capability to view GeoPDFs in Environmental Systems Research Institute's™ ArcGIS™, which is included in TerraGo Publisher® for ArcGIS.



A GeoPDF of a three-dimensional map of the Tennessee River Valley

AGC also had a hand in converting all the nearly 60,000 USGS Digital Raster Graphic GeoTIFF files (based on the tagged image file format) into GeoPDF using TerraGo Publisher for Raster. USGS posted the files on its store website, where an average of nearly 250,000 GeoPDF files have been downloaded each month, compared to the 4,000 monthly downloads before the availability of GeoPDFs.

AGC will convert all NGA's Arc Digital Raster Graphics (ADRGs) into GeoPDFs. ADRG covers most the world at different scales—1:1,000,000 scale for most of the world, down to 1:25,000 for small areas around the globe. ADRG is the basis for NGA's creation of the Compressed Arc Digital Raster Graphics (CADRG). AGC is also working with NGA to get all of NGA's geospatial intelligence products (maps, charts, and images) into GeoPDFs and to update current files to support the import and export of geospatial data with Reader for data exchange, or round-tripping as it is called by Adobe. It has also developed its Urban Tactical Planner™ (UTP) in GeoPDFs, along with engineering route studies, urban water graphics, country overviews, GeoPDF BuckEye map books, cultural maps, and the AGC library's non-NGA maps and atlases.

GeoPDFs Available at Websites

AGC also disseminates GeoPDFs via its websites. The following were recently added to its GeoPDF webpages:

- Unclassified Haiti GeoPDF country coverage and miscellaneous GeoPDFs of Haiti
- GeoPDF UTPs for Bolivia, Brazil, Colombia, Cuba, Haiti, Iran, Iraq, Morocco, Panama, Peru, and Somalia
- Country overviews for Benin, Bissau, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Haiti, Liberia, Mauritania, Namibia, Senegal, Sierra Leone, Tunisia, Western Sahara, and Yemen
- Camp Swift, Texas
- NGA image base maps of Mexico

AGC continues to work with TerraGo Technologies to ensure that its handheld Windows® Mobile GeoPDF software meets Army requirements. The center is also assisting TerraGo Technologies in its efforts to market a three-dimensional GeoPDF prototype.

GeoPDF data sets are available at the following websites:

- PKI (common access card required): <*https://tsunami.tec.army.mil/Products/MapArchive/*>
- SIPRNET: <*www.agc.army.smil.mil/Products/MapArchive/*>
- JWICS: <*http://www.agc.army.ic.gov/Products/MapArchive/*>

For more information about the Army GeoPDF program or to order copies of GeoPDF country DVDs, visit the websites above or contact the author at <*raymond.caputo@us.army.mil*>. Readers are also encouraged to contact Mr. Caputo if they know of any GeoPDFs being produced by other organizations.

Mr. Caputo is a geographer with AGC's Geospatial Requirements Integration Branch, United States Army Corps of Engineers, Alexandria, Virginia.

Welcome Addition:

210A Warrant Officers in Modular Engineer Companies

By Captain John A. Dills III

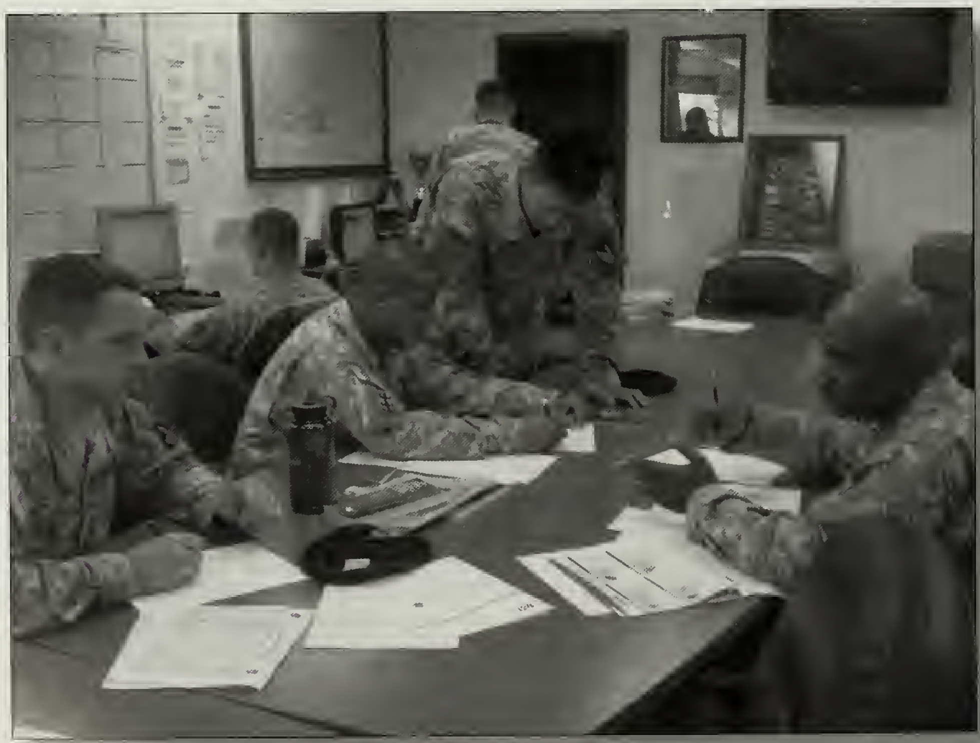
In recent years, our Engineer Regiment and Corps have undergone transformation, and this transformation has been especially profound for construction units. One of the most significant changes was the addition of a military occupational specialty (MOS) 210A Construction Engineering Technician[1] to vertical construction companies. With this addition comes the question: What is the best way to integrate a warrant officer into those companies? The 554th Engineer Company considered this question in early 2008 and employed a plan that effectively integrated and synchronized these construction experts.

Prepare to Receive

It was important to consider two issues when integrating 210As into the company's command structure. The first issue was related to leadership and responsibility. By adding a warrant officer to a platoon, there was the potential for conflict with the platoon leader and platoon sergeant. Furthermore, Soldiers who were accustomed to the established chain of command could become confused about the role of the warrant officer. The 554th avoided this conflict by placing the warrant officers under the direct supervision of the company commander. Likewise, the warrant officers' rating chain did not include the platoon leaders; instead, it was linked to the company and battalion commanders.

The second consideration was the Regiment's intended role of the warrant officer. The 210A Branch Manager provided guidance on the company's plan and the Regiment's intent. After hearing the company's proposed plan to use the warrant officers as technical advisors, the branch manager agreed that the company's plan and suggested rating chain were in keeping with the Regiment's intended use of the 210As in the modular force.

Having determined how to best use the warrant officers, the company turned its attention to the integration of these welcome additions. To accomplish this task, the company commander contacted the warrant officers identified on the unit's "Gains Roster" to welcome them and to gather their expectations of how they would fit into the company's command structure.



Members of the 554th Engineer Company go over plans for a new project.

Then the company developed a detailed initial counseling to enable the warrant officers to assume their role and responsibilities with a clear understanding. The counseling expressed requirements far beyond their technical title. They were charged with assisting in mentoring, guiding, and developing the lieutenants and Soldiers in their platoons. In addition, they serve as a unique source of advice and influence within the platoons. As such, they report directly to the commander with their recommendations on ways to resolve prolonged conflicts.

Integration

During a "Leader's Luncheon," the company commander stressed that the 210As are the company's technical expertise placed within the platoons to enhance the platoon's construction efforts. Additionally, the 210As within the platoons were not to assume or serve in supervisory positions, but to assist, guide, and mentor the platoon on engineering and construction tasks. Furthermore, the commander explained that the 210As were the company's internal quality control and quality assurance points of contact. The 210As would serve as the initial points of contact for outside entities as the platoons pressed forward with their missions. This would enable the lieutenants to focus on the administration and project management of their respective platoons while allowing their platoon sergeant to dedicate more time to personnel management and mentoring the unit's future noncommissioned officer leadership.

Key to Success

By having this distinct division of labor, the company not only created an efficient system of checks and balances but also laid the foundation for effective cooperation and communication within the platoons' leadership and clearly defined the positions and responsibilities of all involved. In retrospect, this was the key to success.

Captain Dills is a project engineer for the United States Army Corps of Engineers, Tulsa District, with duty at Fort Sill, Oklahoma. Previously, he was commander of the 554th Engineer Company; assistant operations officer, construction officer, and logistical officer in the 92d Engineer Battalion; and sapper platoon leader, brigade engineer, and theater construction officer in the 3d Infantry Division—all at Fort Stewart, Georgia—and was Chief of Facilities and Plans, Multinational Corps–Iraq. He holds a bachelor's in architectural design from Morris Brown College and a master's in architectural planning from Florida Agricultural and Mechanical University.

Endnote

[1] Effective 1 February 2010, the 210A MOS title changed from Utilities Operation and Maintenance Technician to Construction Engineering Technician.

Note: The author wishes to thank the following people for their contributions to the article: LTC Diana Holland, Commander, 92d Engineer Battalion; CW4 Lee Morris, 210A Branch Manager, Human Resources Command; MAJ James Schultze, Operations Officer, 92d Engineer Battalion; MAJ Andrew Kelly, Executive Officer, 92d Engineer Battalion; WO1 Larry Butterworth, 210A, 554th Engineer Company (Vertical); and WO1 Tyrone White, 210A, 554th Engineer Company (Vertical).

THE ENGINEER WRITER'S GUIDE

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

Articles submitted to *Engineer* must be accompanied by a written release by the author's unit or activity security manager prior to publication. All information contained in the article must be unclassified, nonsensitive, and releasable to the public. *Engineer* is distributed to military units worldwide and is also available for sale by the Government Printing Office. As such, it is readily accessible to nongovernment or foreign individuals and organizations.

We cannot guarantee that we will publish all submitted articles. They are accepted for publication only after thorough review. If we plan to use your article in an upcoming issue, we will notify you. Therefore it is important to keep us informed of changes in your e-mail address and telephone number. All articles accepted for publication are subject to grammatical and structural changes as well as editing for style.

Send submissions by e-mail to *<leon.engineer@conus.army.mil>* or on a CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication by other Army professional bulletins.

USACE Projects Impact Iraq's Environment

By Mr. Ronald A. Reeves and Mr. Scott D. Harris

The Army's focus on environmental sustainability is evident in projects in the Iraq theater of operations where the United States Army Corps of Engineers (USACE) Gulf Region District (GRD) manages construction.[1] Solar-powered street lights installed in Fallujah, for example, use the sun's renewable energy, balancing the needs of the environment and communities by providing power, conserving natural resources for other uses, and improving air quality through reduced air emissions.

Greater Environmental Ethic

Environmental conservation is not something that was practiced during Saddam Hussein's regime, but in visits by USACE team members to more than 200 project sites throughout Baghdad and Al-Anbar provinces, many Iraqis indicated that they were in survival mode—worried about feeding their families, having a roof over their heads—and found it difficult to get excited about other issues. However, as the Iraqi security situation has improved, citizens are able to focus on other needs and may embrace a greater environmental ethic as time goes on.

Since no one wants to live in an environment strewn with trash—or where children walk in open sewer drainage ditches, or where the purity of water or air is questioned—projects that are built in partnership with the government of Iraq, the U.S. government, and GRD are providing essential services that many Americans take for granted, such as clean water and sewage removal.

Of significance is the Sadr City Water Treatment Plant, which provides 200,000 Sadr City residents with clean, potable water—and employs numerous local Iraqis for facility operations, maintenance, and administration. The three-year, $65 million endeavor supplies water to 27 sectors in Sadr City at a rate of 4,000 cubic meters per hour. Also completed is the restoration of the Khark Water Treatment Plant north of Taji, which contributes 43 percent of the potable water to Baghdad. Three neighborhoods, or *mahallas*, in south Baghdad received nearly 41 miles of water mains, ranging from 4- to 12-inch pipe. The dearth of potable water supply networks in Baghdad and elsewhere has been addressed by projects that have helped double the number of people on potable water systems throughout Iraq.

GRD photo by Kendal Smith

Fallujah Wastewater Treatment Plant under construction by USACE Gulf Region District

USACE sewer projects that serve citizens include the $30 million project in Kamaliya, in which approximately 36 miles of sewer pipe and 10 pump stations were installed. In partnership with the government of Iraq, GRD is completing other sewer improvement projects throughout the central region in Doura, Adhamiyah, Mansour, New Ubaydi, and Fallujah.

Major Reconciliation Project

Begun in 2004 and approximately 90 percent complete, the Fallujah Wastewater Treatment Plant's revised design will treat 40,000 cubic meters of water per day, projected to serve 200,000 residents. U.S. State Department officials call it a major reconciliation project that will discharge disinfected water into the Euphrates River, where residents downstream take their drinking water. The design allows for future expansion as the government of Iraq grows its infrastructure. This project of vast scope has involved retrofitting—in extremely close quarters—Baghdad and Fallujah with sewer systems.

One element often overlooked is waste management; landfills are the USACE contribution to that, both on forward operating bases and in the city of Baghdad. Northeast of Baghdad in Rusafa, GRD will build a sanitary landfill—not like those in the temperate regions of the United States, but designed for Iraq's arid climate. GRD has also built incinerators to more effectively handle solid, medical, biological, and routine waste.

Photo courtesy Office of the Secretary of Public Affairs

Street in Kamaliya before sewer system construction began

Joint Environmental Effort

USACE and the government of Iraq are committed to improving conditions throughout Iraq. GRD, headquartered in Baghdad, is a joint effort comprising civilians, Soldiers, Sailors, Airmen, and contractors and provides high-quality and sustainable engineering in support of civil and military construction in Iraq. GRD and its Iraqi partners are building a strong foundation for Iraq's future.

In everything USACE has done—whether a road project, school project, or police station—there has been an environmental component. Whenever their established forward operating bases, post camps, and stations are closed out, USACE makes it a point to leave them as clean as—or cleaner than—when they arrived. As Iraq continues to grow as a secure, stable, and self-governing nation, GRD has finished hundreds of projects in the public works and water sector. Since 2004, USACE has completed 896 water and sewer projects throughout Iraq and 44 others are ongoing. These projects directly benefit more than 5 million people.

Mr. Reeves served as a public affairs specialist for the USACE Gulf Region District, based near Baghdad, Iraq, until October 2009, when he redeployed to pursue other opportunities in his home state of Texas. He served in the United States Army Reserve as a journalist and broadcaster from 2003-2008 before joining the USACE reconstruction effort in Iraq last year.

Mr. Harris is Public Affairs Chief for the USACE Gulf Region District, based near Baghdad, Iraq. He served in the United States Submarine Force for ten years before becoming a public affairs specialist in 1995. He holds a master's in communications from the University of Oklahoma.

Endnote

[1] The Gulf Region Division (GRD) inactivated in September 2009 and no longer exists. Presently the Gulf Region District (GRD) and Gulf Region South (GRS) both report to Transatlantic Division, based in Winchester, Virginia. In April 2010, GRS will inactivate, leaving Gulf Region District as the only USACE organization in-theater.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Apr 09	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Revising manual to incorporate the Engineer Framework. Expect the manual to be published 2QFY11.
Organizational Manuals			
ATTP 3-34.22 (FM 3-34.22) (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations –Brigade Combat Team and Below*	Pending Feb 09 (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual encompasses engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** To become an Army Tactics, Techniques, and Procedures (ATTP) manual 3QFY10.
ATTP 3-34.23 (FM 3-34.23) (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	Pending Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15 and FM 5-116. **Status:** Expect the manual to be published as an ATTP manual 3QFY10.
Combat Engineering			
FM 3-90.4 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include the renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The Marine Corps is dual-designated on this manual, which will replace their Marine Corps Warfighting Publication (MCWP) 3-19.3, *Marine Air-Ground Task Force (MAGTF) Breaching Operations*. **Status:** To be published 2QFY11.
FM 3-90.8 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sep 94; Mar 85	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE). The Marine Corps plans to adopt this manual also. **Status:** On hold for release of FM 3-90, Tactics.
General Engineering			
TM 3-34.48 1/2 (FM 3-34.410 Volumes I & II) (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Pending Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Air Force (as well as the Navy and Marine Corps) plans to adopt the new manual also. **Status:** Expect the manual to be published 4QFY10.
TM 3-34.41	*Construction Planning and Estimating*	NEW	This new manual is being produced by the Navy, in coordination with the Army and Air Force. The manual will provide the TTP and planning factors for conducting construction planning at the crew leader level. The manual will also provide useful expeditionary construction planning factors for use by planners at all levels. **Status:** Expect the manual to be published 2QFY11.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

General Engineering (continued)

Publication Number	Title	Date	Description (and Current Status)
TM 3-34.43 (FM 3-34.451) (FM 5-472)	*Materials Testing*	Pending Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well. **Status:** Expect the manual to be published 3QFY10.
FM 3-34.65 1/2 (FM 3-34.465) (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Pending Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. **Status:** Preparing Volume II. Initial draft staffing of both volumes 3QFY10.
TM 3-34.49 FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Pending Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and Marine Corps includes the newest technologies, current practices, and revised formulas. **Status**: Expect the manual to be published 3QFY10.
FM 3-34.5 (FM 3-100.4)	*Environmental Considerations*	Pending Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** Estimated date for posting to Army Knowledge Online (AKO) is 3QFY10.
TM 3-34.56	*Waste Management*	NEW	This manual addresses issues not currently integrated into FM 3-34.5, *Environmental Considerations*. The manual will address the role of waste management in support of deployed forces, as well as the integration of waste management throughout the operations process, including its critical linkage to the composite risk management process. **Status:** Expect the manual to be published 4QFY10.

Geospatial Engineering

Publication Number	Title	Date	Description (and Current Status)
ATTP 3-34.80 (FM 3-34.600) (FM 3-34.230)	*Geospatial Engineering*	Pending 3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Estimated date for posting to AKO is 3QFY10.

NOTEs: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 10 February 2010.

Route Reconnaissance and Clearance: A Marine Aircraft Wing Future Capability

By Major Nick I. Brown and Major Taylor P. White

The United States Marine Corps invests in the Marine Wing Support Groups and its subordinate Marine Wing Support Squadrons (MWSSs) to provide sustained aviation ground support to the aviation combat element (ACE) of the Marine Air-Ground Task Force (MAGTF). The primary mission of the MWSS is to enable sortie generation and expeditionary operations by Marine aviation. Marine aviation must constantly push the objective to be the extended fighting arm of the rifleman, available at a moment's notice. The ability to swiftly create temporary, expedient helicopter landing zones; leapfrog forward arming and refueling points with the advancing force; conduct replenishment combat logistics operations; or rapidly construct expeditionary airfields and airbases permits Marine aviation to be in the front pocket of the MAGTF commander. Therefore, mobility of the MWSS on the battlefield is essential, and the route reconnaissance and clearance (R2C) capability coming to the MWSS will multiply the ACE's expeditionary ability and continue to set it apart from the aviation organizations of the other Services.

Maintaining Mobility

Mines and improvised explosive devices (IEDs), also known as roadside bombs, remain the No. 1 killer of U.S. troops in Iraq and Afghanistan. In addition to inflicting casualties, these explosive hazards restrict MAGTF maneuver and mobility, therefore shaping our operations. R2C capability is of vital importance to maintain the commander's freedom of maneuver and protect Marines.

The strategic and operational effects of employing explosive hazards have been high, with a relatively low risk and investment for our enemies. The current operational context in United States Central Command's area of operations and projected enemy tactics, techniques, and procedures (TTP) prove that IEDs will be a real and foreseeable threat to our military for years to come. As a result, there will be a high demand for route clearance equipment and personnel throughout the MAGTF, creating competing demands on limited assets and resources.

General William L. "Spider" Nyland, former Assistant Commandant of the Marine Corps, once said, *"The demands of expeditionary maneuver warfare require the MAGTF commander to have assured access, an ability to conduct movement and maneuver, and an ability to retain the initiative with high operational tempo. The asymmetric nature of the mine threat and its increasing sophistication and proliferation combine to make the attainment of adequate countermine, counter-IED, and counterunexploded ordnance capabilities critical to the future of our Corps and its role as our nation's most responsive force in readiness."*[1] To ensure flexible and responsive aviation ground support to the ACE, R2C must be an integral part of the MWSS and an assured capability of the Marine aircraft wing. This article discusses how the R2C concept was implemented by the MWSS supporting the 2d Marine Aircraft Wing (Forward) during Operation Iraqi Freedom, the benefits and challenges R2C presents to the ACE, and the way ahead for R2C within the wing.

Providing Aviation Ground Support

Upon arrival in Al Anbar Province in support of Operation Iraqi Freedom, MWSS-271 (Reinforced) began providing aviation ground support to the 2d Marine Aircraft Wing (Forward). This support included the following:

- Aircraft and ground refueling
- Aircraft rescue and firefighting
- Weather services
- Motor transport support, to include convoy operations and maintenance
- Explosive ordnance disposal (EOD)
- Utilities support
- Heavy equipment support
- Expeditionary airfield services, to include airfield marking and lighting, arresting gear support, and certification of expeditionary landing zones and lighting systems

To help with these support missions, the MWSS has an organic platoon of combat engineers who provide general and combat engineering support to 2d Marine Aircraft Wing (Forward).

The MWSS R2C team stages equipment for movement in Al Anbar Province. Pictured is the Husky Metal Detecting and Marking Vehicle.

The United States Army relocated several route clearance teams to Afghanistan and other areas in Iraq. This shift in forces meant that Multinational Forces–West (MNF–W) had to field its own route clearance teams from Marine engineer units already in-theater. After assuming the aviation ground support mission, the MWSS explored the feasibility of retasking its combat engineer platoon to conduct route clearance in support of MNF–W operations.

The new R2C was a daunting challenge for MWSS-271. Having recently relieved two squadrons, the unit was fully engaged as the only MWSS in Al Anbar Province. Now it would have to prepare in-theater for a mission never before assigned to an MWSS. The combat engineers in the platoon had spent the past year preparing to conduct airfield repairs and honing their vertical construction skills, but now would train on equipment and techniques none of them had ever seen before. However, they also had to be prepared to provide mobility, survivability, and countermobility support to the ACE. Since most vertical construction was being handled by contractors, the combat engineers were able to support the ACE mission. Also, knowing that the MWSS would eventually inherit this capability, coupled with the number of convoys required to support outlying airfields, it was obvious that a route clearance team would benefit the ACE and the entire MAGTF. The limited number of combat engineers in the support squadron might have prevented fielding a dedicated R2C team in a more expeditionary environment or in a setting demanding more general engineering projects.

Task-Organizing for Route Clearance

The combat engineer platoon was task-organized for this specific mission. The nominal requirement for a route clearance platoon was about two dozen Marines with limited specialties. The combat engineer platoon at Al Asad was busy and had small detachments of engineers at other locations in the area, performing runway repairs at Al Taqaddum, vertical construction at Al Asad, general engineering tasks at Sahl Sinjar, and dust abatement throughout the area of operations. As a result, the support squadron assigned Marines of various specialties from other platoons to complete the team. The route clearance team consisted of Marines with additional specialties that proved valuable for maintaining equipment, providing security, and enabling combat engineers to focus on the technical aspects of the route clearance duties.

Due to the task organization of multiple Marine units into route clearance teams, the MNF–W counter-IED cell arranged for in-theater training by a mobile training team from the United States Marine Corps Engineer Center of Excellence that focused on vehicle employment, sweep

An MWSS Marine inspects the Buffalo Mine-Protected Clearance Vehicle (MPCV).

formations, and IED interrogation and identification. The newly formed MWSS R2C team also conducted mine-resistant, ambush-protected vehicle licensing, demolitions training, day and night live-fire shoots, IED training lanes, combat lifesaver training, and communications training for seamless close air support coordination. Because of MNF–W needs, the coordination, standup, and training of the teams was greatly accelerated. The R2C program of record was devised in 2009 and continues to move toward maturity in both training and TTP. Furthermore, as enemy TTP change, our training and preparation will continue to evolve.

Assuming the Mission

Upon completion of training, the R2C team began transition training with the outgoing Army unit and assumed responsibility for the route clearance mission. The team conducted numerous missions searching the main supply routes for IEDs. Trash or debris determined not to be an IED was cleared away so that later convoys would not have to interrogate it for potential hazards. When IEDs were identified, MWSS EOD specialists were called to neutralize the devices. With the closure of several outlying airfields, flight line EOD requirements were reduced and the MWSS-271 EOD team was eventually embedded with the R2C team. However, it would be difficult in the future to dedicate an EOD team from the ACE to full-time route clearance missions. Having dedicated EOD teams from the ACE perform the full-time route clearance mission depends on airfield requirements and ACE priorities.

The R2C team was in general support to MNF–W but remained under the control of MWSS-271. To provide effective command and control of the route clearance mission, MWSS-271 designated an officer in the operations section who focused exclusively on route clearance operations. This dedicated resource in the Aviation Ground Support Operations Center was critical for coordinating R2C missions with higher headquarters, requesting and coordinating air coverage where needed, and coordinating necessary support with adjacent units. The R2C team remained in close contact with maneuver battalions in the regimental combat team's area of operations to ensure proper coordination for movement, EOD support, quick-reaction force support, and seamless communication and intelligence feedback. Additionally, the team submitted joint tactical air requests to provide overwatch and escort of route clearance missions. The team's innovative use of communication to coordinate its moves helped the squadron in its daily operations and served as a template for direct support of the ACE.

MWSS-271 conducted convoys and missions throughout Al Anbar Province involving helicopter landing zone installation and removal as well as the retrieval of gear and equipment. Route clearance teams inspected and cleared routes before convoy movements, removing possible hazards from main supply routes and enabling unimpeded movements. The squadron demonstrated the flexibility of its combat engineers and support personnel while proving the concept of mobility support to the ACE.

The ability to clear a route of any length requires a huge investment in time, manpower, and resources. High-demand, low-density capabilities such as R2C invariably (and justifiably) go to support the ground combat element or its supporting units. Organic R2C assets for the MWSS granted flexibility to the ACE commander and benefitted airfield and airbase support functions by increasing responsiveness and maintaining ground mobility to forward areas that required support.

The advantages of having an R2C team in the ACE are not limited to support for convoy movement. The ability to detect explosive hazards would provide the following advantages:

- Enhance air base security
- Protect personnel by clearing tactical areas such as forward arming and refueling points
- Enable road movement essential to support highly mobile and flexible helicopter and fixed-wing operations
- Improve tactical recovery of aircraft and personnel
- Assist in base recovery after attacks by allowing assessments of the airfield and facilities, detecting and mitigating unexploded ordnance, and clearing explosive hazards

Facing New Challenges

The R2C capability will present new challenges and compete for the general engineering services necessary to support the ACE during operations. As an emerging mission for the MWSS, R2C will require the following considerations:

- Employment and maintenance of the capability
- Additional burdens on a limited number of combat engineers organic in the MWSS
- Additional training requirements
- Possible mission creep to support the MAGTF route clearance requirement

As demonstrated by MWSS-271, the ability to conduct route clearance missions outside the ACE required flexibility and creativity. The task list for combat engineers in the ACE is long and diverse. Engineering services necessary to support the ACE during expeditionary operations include, but are not limited to, the following:

- Airfield surface repair (rapid runway repair)
- Expeditionary structure construction (SEAhuts, strongback framing)
- Assembly and construction of prefabricated shelters and K-spans
- Force protection and survivability construction
- Limited combat engineering services (countermobility, obstacles), construction, improvement, and maintenance of helicopter landing zones

Supporting all these requirements, plus providing a full-time R2C team in general support of MNF–W, with just one platoon requires careful prioritization. MWSS engineers have a diverse and demanding task list when supporting the ACE in an expeditionary environment. Adding a full-time R2C mission will compound the challenge while enhancing the squadron's ability to support airfield operations. The squadron's combat engineers are required to provide limited mobility and mine detection support and the R2C capability would enhance their ability to accomplish these tasks.

Aviation ground support directly extends and expands the employment of Marine aviation. It is a decisive component that gives Marine aviation its expeditionary ability. With an organic R2C capability, the MWSSs will provide better support to the ACE. MWSS-271 proved the value and benefits of an R2C capability during Operation Iraqi Freedom. R2C presents many advantages as well as aviation ground support challenges, but the expeditionary enabler capability within the MWSS is an assured force multiplier to Marine aviation.

Major Brown is the Aviation Ground Support Coordinator, Headquarters, Marine Corps Department of Aviation, Washington, D.C. He graduated from the Combined Logistics Captains Career Course, Fort Lee, Virginia; the Weapons and Tactics Instructor Course, Yuma, Arizona; and the United States Army Command and General Staff College, Fort Leavenworth, Kansas. He holds a bachelor's in political science from Stony Brook University, Stony Brook, New York; and a master's in public administration from Central Michigan University.

Major White is the executive officer of MWSS-271 and has been selected to attend the United States Marine Corps Command and Staff College, Quantico, Virginia, in the fall. He graduated from the Basic School and the Combat Engineer Officer Course, United States Marine Corps Engineer School, Camp Lejeune, North Carolina; the Expeditionary Warfare School, Marine Base Quantico, Virginia; and holds a bachelor's in political science from Tennessee Technological University.

Endnote

[1] *Marine Corps Gazette*, "The Engineer Center of Excellence," November 2008, <*http://www.mca-marines.org/gazette/nov08-prickett.asp*>, accessed 4 March 2010.

Battle of Dara

By Captain Andrew J. Dornstadter

Each session of the Engineer Captain's Career Course (ECCC) is required to write an article analyzing a historical battle, and the best overall professional article receives the Thomas Jefferson Writing Excellence Award. This article was judged the best article of ECCC 1-09.

In the early 6th century A.D., the Eastern Roman—or Byzantine—Empire's eastern boundary was continuously tested by the Persian Empire's aggressive expansion and growing influence. Dara was a fortified city and strategically important Byzantine military post that overlooked a major route between Persia and Mesopotamia. At the Battle of Dara in June 530 A.D., 25,000 Byzantine soldiers led by Flavius Belisarius routed a Persian expeditionary force of 50,000. The Byzantine victory substantially weakened Persia's westernmost army, halting Persian efforts to mount an overwhelming offense across the eastern boundary of the Byzantine Empire and leaving Persia's western border region vulnerable to seizure. Persia was therefore forced to negotiate terms for an enduring peace, and the Byzantine Empire's integrity was preserved.[1]

The Byzantine victory was largely due to Belisarius's effective intelligence preparation of the battlefield (IPB) and his employment of the principles of surprise and unity of command. Superior IPB helped Belisarius anticipate the Persian formations and actions and understand the effects of the terrain on a Persian attack on Dara. The Byzantine use of surprise contributed to a shocking counterattack that unbalanced the Persians and disintegrated their command and control. Finally, the unified Byzantine command structure enabled coordination and defensive flexibility to overcome Persian mass.

Phases of the Battle

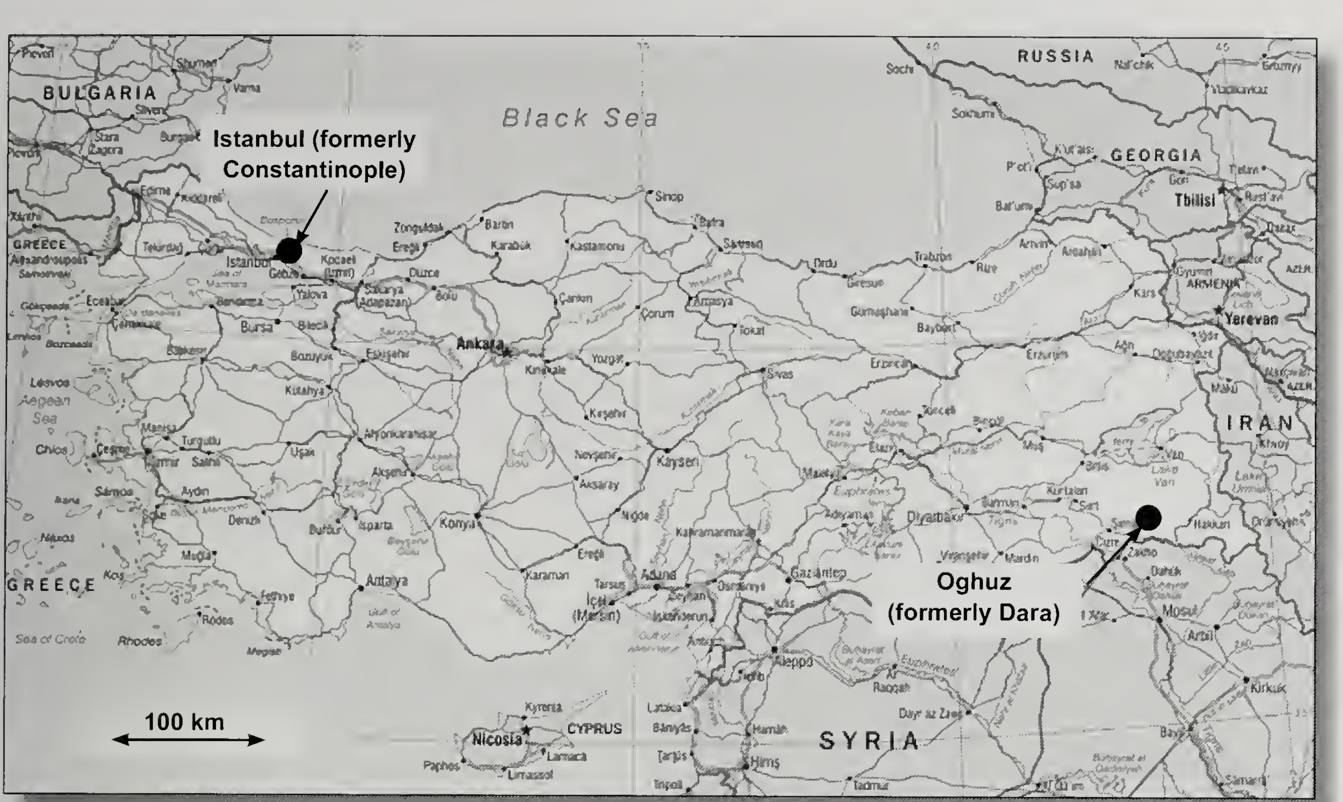
The Battle of Dara can be divided into three distinct phases:

- Phase I. Initial formations and first Persian attack
- Phase II. Persian right wing attack
- Phase III. Persian left wing attack

Phase I

On the battle's first day, the two forces placed their formations. Belisarius placed archers and infantry at his army's center behind a considerable trench line, protecting their flanks with light Hun cavalry.[2] Heavy cavalry troops were placed beyond those units to the outside, commanded by leaders named Bousez and John, while Belisarius maintained a heavy cavalry reserve in the rear. The Persian formation consisted of two long lines, each of which had centrally located infantry protected on either side by mixed cavalry.[3] Following a brief correspondence between the opposing generals, Firuz—the Persian commander—sought to determine the Byzantine force's response to an attack on its left. He ordered forward his right wing cavalry, commanded by Pityaxes. The Persian right wing cavalry pushed back the Byzantine left, and Pityaxes observed the possibility that he might be flanked as his Persians achieved depth and exposed their left side. Pityaxes therefore ordered his right wing cavalry to withdraw and avoid a decisive loss.

> ***"...maintaining an unseen and uncommitted force offers a commander the opportunity to surprise an enemy through the application of unexpected combat power..."***



Modern regional map of Turkey

Observing the Persian effort against his left, Belisarius determined that the attack was the rehearsal of a likely future effort. He used this information to understand the Persians' strengths and weaknesses and their reaction to his centrally positioned Hun cavalry. Belisarius identified the Persian vulnerability to a flank attack and anticipated a stronger effort against his center on the next such attack. Therefore, he concealed a small cavalry contingent, commanded by Pharas, behind the dominant hill north of the Byzantine defense. This small force could mount a surprise attack against the Persian right's outside flank on their next attempt.

Belisarius's observation of the Persian maneuver led to conclusions that drove a new course of action (COA), demonstrating the importance of IPB. Observation of the enemy helps a commander evaluate the threat and determine threat COAs, a process that helps the commander understand and visualize the enemy's scheme of maneuver and plan friendly COAs accordingly.

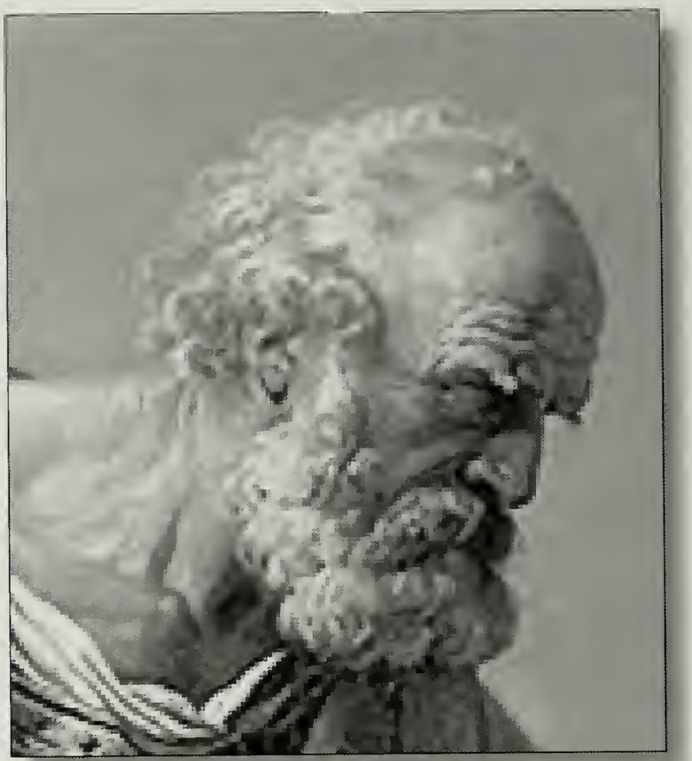
This lesson is captured in modern United States Army doctrine. Field Manual (FM) 5-0, *Army Planning and Orders Production*, defines evaluating the threat as "analyzing intelligence to determine how adversaries normally organize for combat and conduct operations under similar circumstances. Knowing enemy capabilities and vulnerabilities allows the commander … to make assumptions about the relative capabilities of friendly forces."[4] These steps of the IPB portion of mission analysis create or confirm the enemy's doctrinal and situational templates. Commanders may then use those tools to develop and select COAs that accomplish their mission.

Phase II

On the second day of the battle, Belisarius's assumption about the Persian COA was confirmed when the Persian right attacked the Byzantine left for the second time. Belisarius knew the Persians would be unprepared for counterattacks against both sides of their force, and he deployed Pharas's concealed cavalry from behind the north hill. Together, that cavalry and the centrally positioned Hun cavalry flanked both sides of the advancing Persian right, effectively enveloping that force. The Byzantine left's cavalry broke the Persian right's attack, killing roughly 3,000 Persian horsemen and foot soldiers and forcing any remaining soldiers from the Persian right to flee in disarray. This eroded Persian command and control and gave Belisarius an unopposed cavalry unit he could flexibly maneuver to assist other Byzantine units on the battlefield.

Concealing Pharas's cavalry behind the north hill deceived the Persian leadership about the composition, disposition, and strength of forces defending from the Byzantine left, so the Persian force was surprised to find forces arrayed differently on the second attack. Shocked by a double flank, the Persian right wing fell apart, leaving the larger Persian army vulnerable to attacks from the Byzantine left's flexible cavalry. This demonstrates the lesson that maintaining an unseen and uncommitted force offers commanders the opportunity to surprise an enemy through the application of unexpected combat power wherever he sees an advantage.

FM 3-0, *Operations*, lists surprise among the nine principles of war and defines it as "(striking) an enemy at a time or place or in a manner for which he is unprepared."



Detail from the 1776 painting entitled "Belisarius" by François-André Vincent. ***Public domain***

It also states that surprise is "the reciprocal of security" and a "major contributor to shock," meaning that effective use of surprise can seriously degrade an enemy's security conditions and reduce the effectiveness of his command and control systems.[5]

Phase III

Also on the second day of the battle, following the Byzantine rout of the Persian right wing, Belisarius maneuvered his left wing cavalry to counter a likely Persian attack against his right. Firuz observed the failure of his attack against the Byzantine left and quickly committed a much stronger force—including the elite Immortals and units drawn from the Persian second line—to attack the Byzantine right wing cavalry commanded by John. This was effective use of shock action, and the Byzantine right initially gave way and withdrew. Belisarius responded quickly by ordering Hun cavalry from his right to attack the long Persian column's inside flank and ordered Hun cavalry from his left to maneuver around the Persian formation's rear and flank the other side.[6]

The two flanks broke the Persian force's advance, and its formation was divided in two. Baresmanes—the Persian left's commander—fell in combat, and John's withdrawn cavalry reorganized and rallied, contributing to the counterattack effort. Together, the flanking Hun cavalry and John's cavalry killed more than 5,000 Persian horsemen and foot soldiers on the Byzantine right. Between this engagement and the rout of the Persian right wing, Belisarius's forces destroyed nearly all of Firuz's cavalry, leaving only the overmatched infantry line, which was exposed and vulnerable.

The Byzantines faced a large, capable Persian force that did not hesitate to mass against their smaller army. By consolidating responsibility and leadership under a single commander, Belisarius overcame a numeric disadvantage. He could quickly and clearly communicate his orders to subordinate commanders, and he could commit resources and apply combat power without confusion or delay. Belisarius's unity of command allowed him to maneuver units where and when they were needed.

FM 3-0 defines unity of command as "(ensuring) unity of effort under one responsible commander" and also that "a single commander directs and coordinates the actions of all forces toward a common objective."[7]

Summary

The Byzantine victory at Dara reestablished the Roman tradition of military excellence on the empire's eastern boundary. Under the command of Belisarius, the Byzantines capably outmaneuvered a much larger force of highly skilled and experienced Persian warriors. The keys to the Byzantine success lay in the commander's mastery of IPB, surprise, and unity of command. Belisarius used these tools and principles to accurately predict the Persian scheme of maneuver and planned his defense accordingly, emphasizing surprise shock action and flexibility under unified effort and leadership. The outcome at Dara guaranteed the Byzantine Empire decades of relative peace along its eastern boundary, and it cemented Belisarius's place as one of the greatest tactical leaders in history.

Captain Dornstadter is the officer in charge of operations for the Division Engineer, 1st Armor Division, Camp Liberty, Iraq. Previous assignments with the 1st Cavalry Division include platoon leader in Bravo Company, 20th Engineer Battalion; platoon leader and executive officer of Sapper Company, 2d Battalion, 8th Regiment; and task force engineer for 2d Battalion, 8th Regiment. He holds a bachelor's in engineering from the United States Military Academy and a master's in engineering management from Missouri University of Science and Technology (formerly the University of Missouri–Rolla.)

Endnotes

[1] John Haldon, *The Byzantine Wars*, History Press, Gloucestershire, 1 November 2008, pp. 28-29.

[2] Lieutenant Colonel Robert R. Leonhard, *Belisarius and Small Force Theory*, *<http://www.armchairgeneral.com>*, accessed 22 July 2008.

[3] Ibid.

[4] FM 5-0, *Army Planning and Orders Production*, pp. 3-17, 3-18.

[5] FM 3-0, *Operations*, p. 4-14.

[6] Simon Goodenough, *Tactical Genius in Battle*, Phaidon Press, London, 1979, p.110.

[7] FM 3-0, p. 4-14.

Transformation in Korea

By Major Rafael Pazos and Captain Miguel Uc

Against the backdrop of current global military operations, the Korean Peninsula is quietly undergoing a significant transformation. To ensure that the alliance between the Republic of Korea (ROK) and the United States maintains its long-term viability in Northeast Asia, the commander of United States Forces Korea (USFK) has implemented a transformation framework based on three priorities:

- Defend the ROK
- Strengthen the ROK–U.S. alliance
- Improve the quality of life for those defending the alliance

Two tasks derived from these priorities are to relocate all U.S. forces to two major hubs south of Seoul and extend accompanied tours to three years. These two tasks are monumental, requiring engineers at every level in Korea to develop creative solutions to support the commander's vision.

Relocate U.S. Forces

Two major hubs for relocation of U.S. forces will be developed by transforming existing bases, camps, and garrisons into enduring installations, making Korea an "assignment of choice."

Southwestern Hub. Osan Air Base and United States Army Garrison (USAG)–Humphreys will be the centerpiece of the future U.S. Army force structure in Korea. This hub already is home to the headquarters of 7th Air Force and will become home to the headquarters for the future Korea Command, Eighth United States Army, and the 2d Infantry Division as U.S. forces realign south of the Han River.

Southeastern Hub. Facilities at Deagu, Chinhae, and Pusan will function as a logistics and storage center.

Two international agreements between the ROK and United States control the relocation of U.S. bases:

Land Partnership Plan (LPP). Signed in 2002, this agreement consolidates and relocates forces not based within the Seoul metropolitan area, namely the 2d Infantry Division. It also provides U.S. forces with dedicated time on Korean training areas and ranges and ensures that safety easements are provided and enforced.

Yongsan Relocation Plan (YRP). Signed in 2004, this agreement relocates U.S. forces and United Nations Command activities out of the Seoul metropolitan area. It also calls for a small U.S. force to remain in Seoul to support the United Nations Military Armistice Commission's rear operations, facilitate communications, and maintain existing partnerships with the ROK government and other governmental and nongovernmental agencies in Seoul.

The execution of the ROK–U.S. agreements is a two-phase process that began in 2002 when U.S. forces were stationed in more than 104 installations with substandard infrastructure.

Phase I: Consolidation. This phase is nearly complete. The United States has consolidated its forces in Korea by closing 37 camps and installations and reducing its force by 8,000 personnel. To demonstrate its commitment and to strengthen the alliance, the United States has returned 35 of the 37 closed camps and installations, totaling more than 12,800 acres, to its ROK allies. In turn, the ROK government has purchased more than 2,700 acres of land to support U.S. relocation directly. The ROK government has begun transferring that land to the United States with an

Part of the massive construction under way at USAG–Humphreys

initial grant of 205 acres at USAG–Humphreys, allowing the ROK–U.S. alliance to begin designing, planning, and coordinating more than $10 billion to construct new infrastructure inside and outside that facility.

Phase II: Relocation. During this phase, nearly 15,000 U.S. Service members will move, and the planned construction program will be executed. The most significant component of the relocation will be the expansion of USAG–Humphreys, located south of Seoul. The installation will be the location of the most intense construction efforts. Outside infrastructure development includes the construction of new roads; a rail extension; and an increase in communication, electricity, natural gas, water, and wastewater capacity in the surrounding communities to support the growth at USAG–Humphreys. Inside infrastructure includes new capacity to support increased facilities and population growth as well as modernizing existing facilities. It will be constructed in conjunction with land development that began in December 2006. So far, 821 acres are under development, with another 1,500 acres still to be developed.

Facility construction has begun and will continue over the next several years. The major facilities to be constructed are the headquarters for Korea Command; Eighth United States Army; 2d Infantry Division; Installation Management Command–Korea; medical facilities, family housing, and schools; communication centers; and the operational and support facilities necessary to relocate the 2d Infantry Division.

Of course, the success of the planned relocation is based on U.S. forces sustaining the readiness to "Fight Tonight," which is both the motto and the mentality of the armed forces in the ROK. To do this, the United States will prioritize unit movements by balancing the maintenance of unit operational linkages and necessary construction efficiencies. Unit moves will be packaged and conducted in manageable components and placed where their locations would maximize their unit operations.

Extend Accompanied Tours

Traditionally, the majority of U.S. forces in Korea have been there on one-year unaccompanied tours, while accompanied tours lasted two years. Originally, U.S. families would have faced undue hardships during tours of Korea. However, changes in Korea and a desire to give Service members more time to spend with their families have led the move to more accompanied tours of longer length.

Throughout the realignment, units will maintain their full spectrum of operational and support capabilities. Efficiencies will be obtained by minimizing swing spaces (unit moves into temporary quarters pending final construction) and relocating units into their final facilities at their eventual enduring installations. The end goal will be a winning result for the alliance as it optimizes the use of ROK–U.S. land and enhances U.S. force protection, readiness, quality of life, safety, and ROK–U.S. mutual defense.

Summary

In summary, U.S. priorities remain focused on transforming USFK to meet future security demands and to strengthen and maintain the ROK–U.S. alliance. The transformation and consolidation of U.S. forces is a major signal of continued U.S. military commitment to the ROK and the alliance, providing increased training opportunities and a less intrusive presence. The consolidation of U.S. forces increases readiness, provides efficiencies and cost savings, and enhances the quality of life of our Service members.

Major Pazos is the deputy commander of the United States Army Corps of Engineers (USACE), Gulf Region South District in Iraq. Previous assignments include facilities and construction project manager for Eighth United States Army; plans officer for the 2d Infantry Division; area commander, Peru, Equador, and Bolivia offices, USACE, Mobile District; and commander, Alpha Company, 249th Engineer Battalion (Prime Power). He holds a bachelor's from Virginia Polytechnic Institute and State University and master's from the University of Missouri–Rolla (now Missouri University of Science and Technology) and the United States Army School of Advanced Military Studies. He is a licensed professional engineer in Virginia.

Captain Uc is a facilities and construction officer for Eighth United States Army in the Republic of Korea. He holds a bachelor's from the United States Military Academy at West Point, New York, and a master's from Webster University.

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ay-August 2010

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Front cover: CPT Joe Byrnes, 554th Engineer Battalion, prepares a Talon robot during the IED 9-Line event of the 2010 Best Sapper Competition at Fort Leonard Wood, Missouri. Byrnes and his teammate CPT Jason Castro won this year's competition. Photo by Luke Waack.

Back cover: U.S. Army photos

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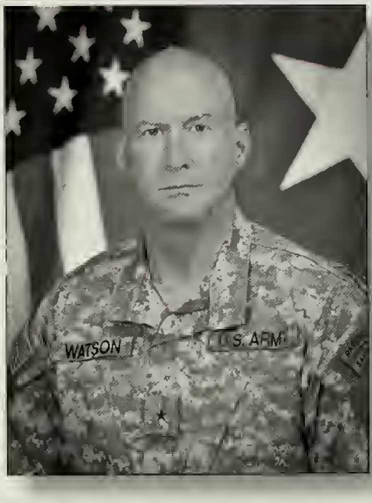
Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School



First and foremost, I want to thank you for an outstanding ENFORCE 2010. It was great to see our leaders—young and old, officers, warrants, and NCOs—gather from across this Regiment to continue the professional debate about the future. Most important, it was extraordinary to see our young leaders at the company level lead the debate—from their foxhole as some of our most proven combat leaders—and have the senior leaders listen to their insight and counsel. I want to extend my sincere thanks to all the young leaders who went above and beyond to be at the center of the debate rather than on the sidelines. Your passion for service to the Army and this profession honors this Regiment. Our future is in great hands!

The chief purpose of ENFORCE this year was to confirm and adjust the Regimental Campaign Plan—based on your feedback—that has become the centerpiece of all actions at your Regimental Headquarters. I urge you to continue to make this YOUR Regimental Campaign Plan. Be an active participant in the decision process, track our progress on achieving the objectives of the various decisive points (DPs), and understand the plan's direction and the assumptions about the future on which the decisions are based. Above all, be able to articulate the plan and its salient points. We have tried to provide you with the ability to tap into the campaign plan through an online dashboard that lays out each of the lines of effort (LOEs), DPs, the progress of staff actions, and a rolling summary of upcoming decisions. And within each DP there is a forum that allows you to provide input into those decisions. You can access the campaign plan with your common access card (CAC) at the following site: *<https://vo.wood.army.mil/sites/CP/ENCP/default.aspx>*. Make this your campaign plan and help the headquarters better serve the Regiment.

To spark your interest, below are the key areas that—based on ENFORCE—will be the focal points of our campaign plan efforts in 2010-2011. This is not the complete list, but the ones where I need your insights. I've listed them by their associated LOE and used the DP number so you can easily find them and provide input using the online dashboard.

LOE #1: Train Engineer Warriors

DP 1-02: Implement Sapper Campus. Sapper Campus will be a premiere training facility with upgraded facilities and training aids and collocated combat engineer and bridge crewmember training, providing maximum space for the student load.

DP 1-04: Institutionalize Counter Explosive Hazards Center (CEHC) Training. Bring CEHC training courses (Route Reconnaissance and Clearance Course [R2C2], Mine Detection Dog [MDD] Course, etc.) in line with other functional courses in the training base under the 1st Engineer Brigade.

DP 1-08: Enlisted Building Great Engineer (BGE) Initiative. The 21R course is training a new program of instruction (POI), expanded by 2 days to incorporate needed blocks of instruction (completed). The 21K course is training a new POI, expanded by 4 days to incorporate needed blocks of instruction (completed). The 21W course is training a new POI, expanded by 13 days to incorporate needed blocks of instruction. Combat engineer training POI(s) include training on newly fielded equipment; training is fully supported through achieving needed doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) requirements as necessary.

LOE #2: Develop Engineer Leaders

DP 2-06: Engineer Leader University. Redesign the education system following a university model that allows the student and gaining organization more input into the individual's education. Allows for "testing out" of classes, better supports the warfight, Army Force Generation (ARFORGEN), and building adaptive leaders.

DP 2-13/14: Interactive and Relevant Instruction. Make education more interactive by dramatically reducing classroom instruction and making small-group problem solving the centerpiece of facilitated instruction based on relevant warfighting challenges.

LOE #3: Support Current Operations

DP 3-09: Mission Rehearsal Exercise (MRX) Academics. Engineer units provide MRX Academics with the engineer technical expertise necessary to allow them to transition smoothly into operations.

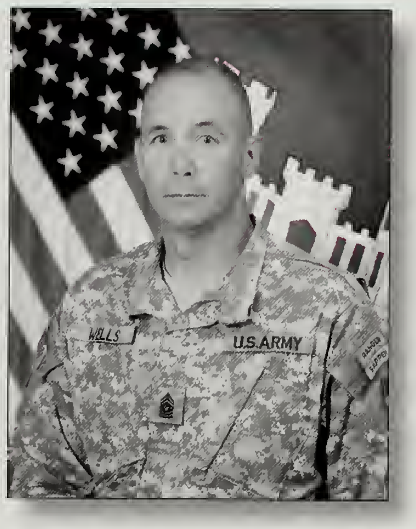
DP 3-10/11: Regimental Lessons Learned Integration and Reachback. Build greater capacity within the Engineer School to collect, track, and integrate unit lessons learned into classroom instruction.

(Continued on page 10)

Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School

Engineers, across all ranks and components, have a big stake in Achieving the Vision for our Regiment. The future policies, doctrine, equipment, and manning for the Regiment depend on the Soldiers, because they're doing the heavy lifting in garrison and in combat. They use the tools, apply the doctrine, and enforce the policies that guide us along a path that gives the Regiment quality engineers, using quality equipment and solving the maneuver commander's toughest problems. Everyone has a vision of what outstanding engineers should be, know, and do. It would be useful to reflect on what present-day maneuver commanders expect of engineers and whether or not we're meeting their expectations.



Maneuver commanders expect engineers to be fit enough to work and fight alongside infantry and armor Soldiers while constructing fortifications or demolishing stuff. When the enemy shows up, commanders expect engineers to lay down their tools and be a part of the attack. We've always prided ourselves on being some of the smartest and most physically fit Soldiers in the world. CPT Tim Touchette and 1SG Mike Balch led by example while I was assigned to Alpha Company, 65th Engineer Battalion. We would lay hold and put in hard physical training, and it paid off when we linked up with our infantry brothers out in the field and showed them how to hump up and down the mountains of Hawaii and arrive at the objective with plenty of gas in the tank. Look out across the Regiment and you'll see that our duties demand the same level of fitness as they did 20 years ago. The Army's newest manual on fitness, TC 3-22.20, *Army Physical Readiness Training (PRT)*, is a step in the right direction, centering all physical training on Warrior Tasks and Battle Drills.[1]

What is your definition of fitness? The Army's PRT manual states, *"To prepare Soldiers to meet the physical demands of their profession, a system of training must focus on the development of strength, endurance, and mobility, plus the enhancement of the body's metabolic pathways."*[2] Most of us are familiar with strength, endurance, and mobility, but the picture gets fuzzy when we discuss metabolic pathways. To keep it simple, there are three main metabolic pathways we use to perform physical activity—the phosphagen pathway, the glycolytic pathway, and the oxidative pathway—and one pathway to convert food into energy—the citric acid, or Krebs cycle. How well you condition your body to use each pathway will determine how well you perform short-duration, high-intensity exercises (like a one rep max deadlift), medium-duration, medium-intensity (2 minutes of sit-ups), or long-duration, low-intensity (6-mile run) exercises. Admitting that we need to be good at all types of physical demands is the first step to recovery. Focus on the weak areas. Some Soldiers are good weightlifters while others are good distance runners, and they tend to train their body on what they're good at and blow off their weak areas. The Army is telling us that we have to be good at all components of fitness, including the metabolic pathways. Dr. Greg Glassman and his wife Lauren have created the CrossFit website that addresses overall fitness and is worth a look.[3] His article "What is Fitness?" is a great place to start. You can find it at *http://library.crossfit.com/free/pdf/CFJ-trial.pdf*

The Krebs cycle is the metabolic pathway that takes carbohydrates, proteins, and fats and converts them into carbon dioxide and water to generate a usable form of energy for the body.[4] In my opinion, it's the most important pathway, and we give it the least attention. This is where the battalion commander and CSM must step in and make amends. Talking to the mess sergeant and coming up with a cost-effective menu that's nutritionally sound is time well spent. The dining facility may not be able to buy the best produce or meats, but there's a lot that can be done with food preparation. Ask the hospital nutritionist to help evaluate the mess hall's meal selection and provide some train-the-trainer classes. Your dining facility has to show a profit, which means the headcount has to stay high. Expecting every leader to eat at least one nutritionally good meal each day at the mess hall is not too much to ask. I've heard Soldiers say that their metabolism is so good that they can eat anything and stay fit. Ask them how much more fit they would be if they ate good meals instead of swallowing cheeseburgers whole and chasing them down with cheesy fries and Mountain Dew®.

The ultimate goal is improving Soldiers' ability to deal with physically and emotionally demanding situations. Their overall fitness depends on your knowledge and experience to develop a plan that is challenging and competitive and raises their desire to improve their own level of fitness.

---

[1] Warrior Tasks and Battle Drills <*https://atn.army.mil/Media/docs/WTBD%20List%20Mar%202010%20-%20Copy.pdf*>.

[2] TC 3-22.20, March 2010, pp. 1-7, para. 1-18.

[3] <*http://www.crossfit.com/*>.

[4] <*http://en.wikipedia.org/wiki/Krebbs Cycle*>.

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer

Happy Birthday, Engineer Warrant Officers! Celebrations at home and abroad marked the Army Warrant Officer Corps's 92d birthday on 9 July 2010. In recognition of the event, this issue of the Engineer Bulletin includes an outstanding article titled "92d Birthday of the Army Warrant Officer" by CW5 David P. Welsh (Retired) on page 70. The article provides a historical overview of warrant officers from the establishment of the Army Mine Planter Service in 1918 to the current Warrant Officer Program. Today, warrant officers make up nearly 15 percent of the Officer Corps and are represented in 17 Army branches, consisting of 70 unique military occupational specialties (MOSs).

The rich history of the Army warrant officer extends to our own engineer warrant officer specialties—Construction Engineering Technicians and Geospatial Engineering Technicians. The first Utilities Maintenance Officer, MOS 7120, was added during World War II in 1943. The Construction Engineer, MOS 7110, was added to the warrant officer ranks in 1948. Engineer warrant officer MOSs continued to evolve, expand, and contract over the next 67 years to meet the Army's needs, highlighted by the Nuclear Power Plant Technician, MOS 351A, which came on line in 1962. Assigned to the Engineer Reactor Group, these highly skilled nuclear power plant technicians could operate fixed and floating power facilities such as the Army's Stationary Medium–1 (SM–1) prototype nuclear reactor and the MH–1A Sturgis floating nuclear power plant, a 45-MW pressurized water reactor. MOS 521A, Utilities Maintenance Technician, created in 1961 and split into two MOSs with the addition of MOS 521B in 1972, effectively took over the nontactical/fixed installation part of the MOS. The Utilities Operation and Maintenance Technician, MOS 310A, was created in 1977, with the numeric designation changing to 210A in 1987. The 210A MOS name change to Construction Engineering Technician signifies a major shift in the MOS's core mission and brings its evolution full circle back to its 1943 roots—Construction Engineer.

The origins of the Geospatial Engineering Technician can be traced back to 1943 and World War II as well, with the creation of the Topographic Engineer, MOS 7915, and the Aerial Photographic Officer, MOS 8502. Over the years, additional MOSs were created and deleted along with various name changes. They included Map Reproduction Officer, MOS 7917; Map Reproduction Technician, MOS 831A; Photomapping Officer, MOS 7916; Photomapping Technician, MOS 811A; Terrain Analysis Technician, MOS 841A; Geospatial Information Technician, MOS 215D; and finally to our present day title, Geospatial Engineering Technician, approved by TRADOC in February. The MOS's numeric designation will change to 125D on 1 October 2010. For the next issue of the Engineer Bulletin, I will solicit specific engineer warrant officer history articles that expand on the information provided above.

On another note, I have been able to visit a few units in the past year and have been extremely pleased with the positive comments I received from commanders and command sergeants major about your technical and leadership abilities. Keep up the great work! I did, however, discover some systemic issues that are challenging our younger warrant officers with regard to Officer Evaluation Report (OER) counseling and professional development. Many warrant officers are not receiving their initial and quarterly OER counseling on time or at all. Engage your rater and senior rater, and get the counseling sessions on the boss's calendar. In addition, warrant officers must be included in Officer Professional Development (OPD) sessions. Ensure that you are tied into the training schedule early, and add this as one of your OER support form objectives. At least once a year, provide a warrant officer brief to the command during OPD. Let's fix this issue now.

The engineer warrant officer accessions board was held the week of 12–16 July. We are not attracting enough noncommissioned officers (NCOs) to become warrant officers, especially Geospatial Engineering Technicians. The addition of seventy MOS 215D brigade combat team positions to the force makes this a great time to become a geospatial warrant officer. We are looking for outstanding NCOs who possess a sustained and demonstrated level of technical and leadership competency as supported by rater and senior rater comments on NCOERs. I urge commanders and warrant officers in the field, when asked for a letter of recommendation, to recommend your best NCOs for the warrant officer program. For more information about the upcoming board or how to become an engineer warrant officer, log on to the Army recruiting website at <*http://www.usarec.army.mil/hq/warrant*>.

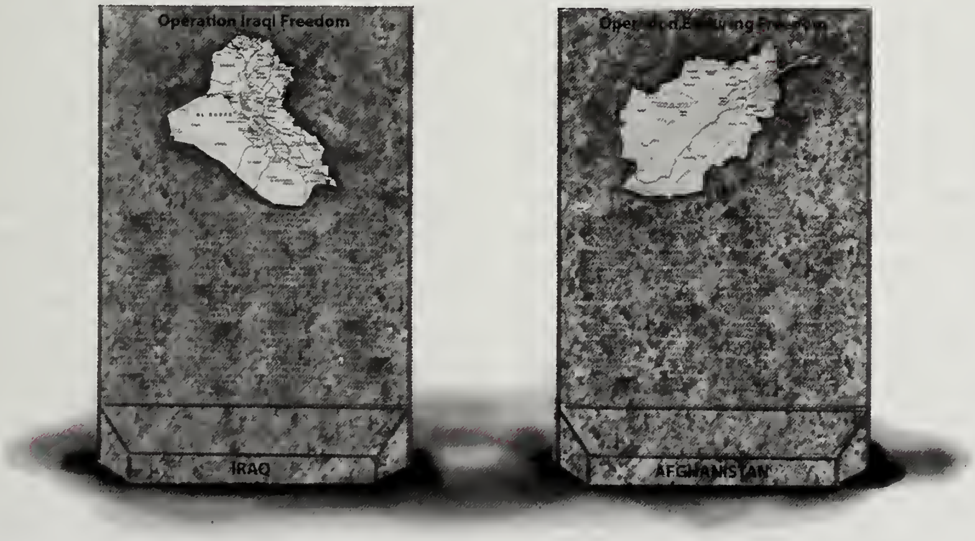
Until next time, stay safe. Essayons!

Dedication

The following members of the Engineer Regiment have been lost in the War on Terrorism since the last issue of *Engineer*, or were inadvertently omitted from a previous list. We dedicate this issue to them.

Anderson, PFC Billy G.	Alpha Company, 508th Special Troops Battalion, 4th Brigade Combat Team	Fort Bragg, North Carolina
Crow, Jr., SGT Robert W.	HHC, 203d Engineer Battalion, Missouri ARNG	Joplin, Missouri
Fisher, SGT Zachary M.	618th Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Grady, SPC Ryan J.	Alpha Company, Special Troops Battalion, 86th Infantry Brigade Combat Team	Bradford, Vermont
Holmes, SGT David A.	810th Engineer Company, 203d Engineer Battalion, Georgia ARNG	Swainsboro, Georgia
Hotchkin, PFC Gunnar R.	161st Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Johnson, SPC Joseph D.	161st Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Johnson, SPC Matthew J.	618th Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Kisseloff, SGT Denis D.	1141st Engineer Company, 203d Engineer Battalion, 372d Engineer Brigade	Kansas City, Missouri
McGahan, 2LT Michael E.	Alpha Company, 1st Brigade Special Troops Battalion, 101st Airborne Division	Fort Campbell, Kentucky
Reed, SPC Jesse D.	618th Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Rodriguez, SGT Mario M.	264th Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Stanley, SGT Chase	618th Engineer Company, 27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina

Proposed Fallen Engineers Memorial



One of the highest priorities of the Army Engineer Association (AEA) is to recognize all Army engineers who have given their lives in the defense of the United States of America. Equally important is to recognize those engineers who received wounds in combat resulting in the award of the Purple Heart. AEA is accepting donations to support the design and construction of a Memorial Wall for Fallen Engineers to be located in the "Sapper Grove" at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment. To learn more, go to <*http://www.armyengineer.com/memorial_wall.html*>.

Photo by Visual Information Center

Fallen Sapper Memorial 2010

By Captain Russell Lehman and Captain Samuel Chiang

During the week of ENFORCE 2010, engineer leaders from across the Regiment gathered together at Fort Leonard Wood, Missouri, to discuss the future of the Regiment, commemorate its great accomplishments, and focus its efforts for the coming years. As the Regiment looked forward, it also took time to look back and honor and remember the engineers who had fallen in combat. The Fallen Sapper Memorial Tribute, conducted on 22 April 2010, was specifically designed to pay humble and respectful homage to the engineer Soldiers who died in combat from April 2009 to April 2010. In addition to those killed in action, the ceremony also paid tribute to the engineers slain in the Fort Hood, Texas, attack in November 2009.

The Fallen Sapper Tribute took place in the Fort Leonard Wood Memorial Chapel, which was originally built in 1942 and has been in use in one capacity or another since its construction. The chapel's private setting, simplicity, and proximity to the Engineer Memorial Grove enabled participants to feel the depth of solemnity inherent in the ceremony. Families, friends, and members of the Regiment were able to view photos of each Fallen Sapper in the chapel. Family members of the Fallen Sappers, who were seated by the photos of their Sappers, were joined by senior members of the Regiment, including the Chief of Engineers, Lieutenant General Robert L. Van Antwerp. Many other senior members of the Regiment were present and were joined by Soldiers from engineer officer courses and advanced individual training courses. It was the first time many of these Soldiers had attended a military memorial tribute, so the ceremony allowed the new sappers to participate in and learn about how we honor those who have made the ultimate sacrifice. It was also a time for family members to see the honors bestowed on their loved ones, hear how much their service and sacrifice meant, and know that they will never be forgotten.

While engineer leaders reflected on the heavy burdens of responsibility that leaders face when Soldiers deploy into harm's way, and remembered their own experiences and their own fallen, the new engineers developed a greater understanding of the solemnity of service to the nation and how important it is to remember those who did not return.

Following the ceremony, the attendees accompanied the United States Army Engineer School Commandant and host of the event, Brigadier General Bryan G. Watson, out of the chapel to the Engineer Memorial Grove. Here, the Chief of Engineers and the Engineer Corps Command Sergeant Major, Micheal L. Buxbaum, placed a memorial wreath to designate the future site of the Engineer Memorial Wall. (See page 5.) Made of Missouri red granite, the wall—with the engraved names of sappers who have made the ultimate sacrifice—will serve as a permanent commemoration of the Soldiers and will ensure that they are never forgotten.

Captain Lehman is the S-3 Officer in Charge, 169th Engineer Battalion, Fort Leonard Wood, Missouri.

Captain Chiang is the Executive Officer, 169th Engineer Battalion, Fort Leonard Wood, Missouri.

BUILDING MOMENTUM FOR THE FUTURE

By Ms. Shirley A. Bridges

Lieutenant General Robert L. Van Antwerp, 52d Chief of Engineers, began his address at the 2010 ENFORCE Conference by talking about the legacy of the Engineer Regiment to remind the attendees of what the engineers stand for.

"We're going to talk together about some of the things important to the Regiment," he said. "But first, you know, it's always great to go back to your history and think about what we stand for."

1775— Bunker Hill, Continental Army. President-to-be George Washington recognized the need for engineer capability and chose Colonel Richard Gridley as the first Chief of Engineers.

1802—West Point. This was the beginning of the Engineer Regiment as we know it today. We were just starting to explore the west, and we needed surveyors and engineers. Today, 51 or 52 percent of the Regiment's officers come out of West Point—the others are out of the Reserve Officer Training Corps (ROTC) and the Officer Candidate School (OCS).

1824—Civil Works Mission. Some incredible things were going on in the Ohio River and the Mississippi River and, by Act of Congress, the Corps of Engineers—the Engineer Regiment—was given the civil works mission. Today, we have 12,000 miles of inland waterways that touch 41 states. And we have 241 locks and dams.

1914—Panama Canal. The Canal was started by someone else, but engineers finished it. Now, they're building a new lock, and we're advising on that.

1941—Construction Mission. Today, we do the construction—to include some for other Services—on 103 military installations.

1943—The Pentagon. We built the Pentagon in Washington, DC, in 15 months; now, it's going to take 13 years to renovate it.

1961—National Aeronautics and Space Administration. We built the NASA facility.

1986— Water Resources Development Act. This authorization document tells the Corps of Engineers how to do what Congress wants them to do.

1986—Cost-Sharing Provision. This changed life in the Corps of Engineers. No longer can we say, "Here's what needs to be done." Now, there has to be a Congressman willing to put in a request and get it authorized and appropriated.

2004—Standup of the Gulf Region Division. At its height, the Gulf Region Division had three districts in Iraq, but two of the three districts have been stood down. We'll be in the third one at least until December 2011. In Afghanistan, we have two districts and a deployable command post—the 412th Engineer Command.

2005—Katrina. This effort involves the largest design-build civil works project ever for the Corps of Engineers—more than $800 million.

2009—Greatest Amount of Work Underway. We have 37,000 people in the Corps of Engineers—more than 100,000 in our Regiment. And we have great partners—400,000 contracts, worth $45 billion.

"That's our history," Van Antwerp said. "That's where we come from. What a wonderful history."

He remarked that a lot of those in the audience know that when he looks at an officer, a noncommissioned officer (NCO), or a civilian, he has 4 Es in his head. He explained that as follows:

- **Energy.** Energy starts with fitness, and you have to keep that fitness up every day until it becomes a lifestyle.
- **Energize.** Energizing others is leadership. Influence. A lot of times it's taking people where they might not want to go, but if they buy into you they're likely to buy into where you're taking them.
- **Edge.** The edge is hard to describe, but when you see it, you know it. It's those people who will say, "I'll be in that pilot program. I want to be out there—I want to be experimenting for the future." They're innovative. Visionaries.
- **Execute.** When you have a $45 billion program, the ultimate test is not going to be all the great disciplined thought you put into it, or whether you have great people. It will be what's left. It's why the buildings we built back during World War II—that were intended to be used for five years—are still standing in some places. It's because they were done right. That's the test.

Van Antwerp gestured as if drawing an imaginary circle that was going counterclockwise like a flywheel. He said that if a flywheel is heavy enough and you get it rolling, it's pretty hard to stop it. But it's very hard to get started. So you have to make sure it gets started, and when you get it started, you want it to go in the right direction—because it's hard to redirect.

He asked the audience to imagine a line drawn from one end of the circle to the other, right through the middle. Then he asked them to mentally divide the top half of the circle into thirds—to represent disciplined people, disciplined thought, and disciplined action—and to divide each third into two parts. Then he explained his "drawing." (The figure to the right, from the book *Good to Great* by Jim Collins, depicts this.)[1]

Disciplined people. One part is about leaders and the other is about getting the right people in the right seat of the bus. How do we select, develop, retain, promote—all those things of great people?

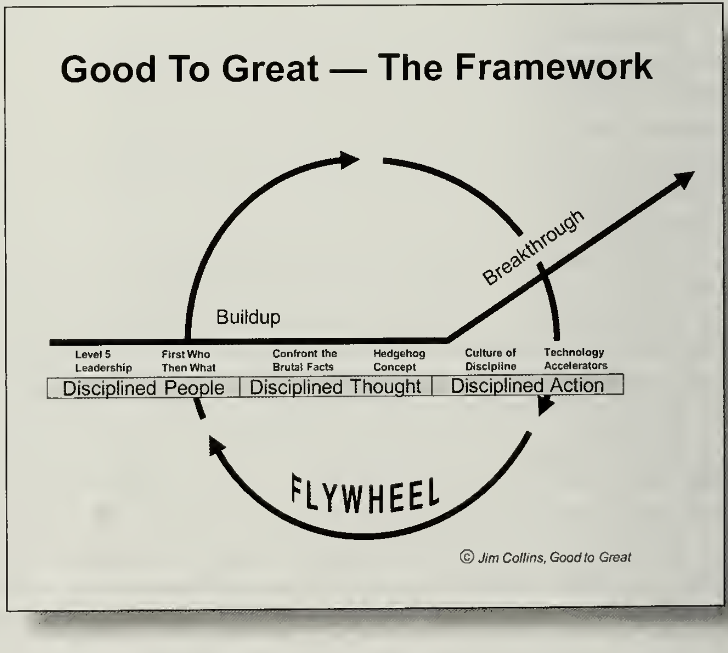
Disciplined thought. One part is similar to an after action review (AAR)—confront the brutal facts; look at yourself really hard. Find out where your pros and cons are, and that is where you start to establish your campaign plan for the future. The other part is called "the hedgehog" in *Good to Great*.[2] Keep your focus; look at your core—what made you great—and if that core isn't changing, invest in that core.

Disciplined action. One of the marks of a great organization is that you tell people what you're going to do, and you do what you say. That's the ultimate mark: You deliver. The second part, though, has to do with innovation and technology acceleration. That is what the edge is. And it isn't about boxes and electrons; it is about having that edge of innovation.

"Now there's something that happens when you get the right people on the bus—and the right leaders, the Level 5 leaders," he said. "When you get that about midway through the *disciplined thought* part, there's a line that goes from the center line up to the flywheel. Where it intersects the flywheel, there's a picture of greatness, but it doesn't mean that you're done, or complete."

Van Antwerp said that we're tracking a lot of things in our campaign plan in the Corps of Engineers, and we're saying when we're complete. When we get close to that point, we're going to say, "What's next? What's the next greatness part there?" But when you go up on that line, one of the things you have to do is have a picture of where that line intersects with the flywheel. And once you get it going, you get momentum. "We have momentum in the Corps of Engineers," he said. "We have momentum in our Regiment right now that we want to keep. In fact, we want to get it going faster and faster."

"I want to talk about something that's kind of near and dear to my heart," Van Antwerp said, "because I think it's on the cutting edge in the future—*how we select and assign people*." He added that "we have this thing called the Green Pages,"[3] and he had four slides to show the audience to expose them to that concept and get them to think about where we're going. "First of all," he said, "using the 'steal (good) ideas shamelessly (SIS) principle,' we stole this idea from IBM, who has what they call the Blue Pages.[4] They use that to put people in the right seats of the bus, using the vernacular of the book *Good to Great*."[5]



© Jim Collins, Good to Great

Slide 1 showed what is available, personnel-wise, and it might be called the "supply side." Young officers in the Engineer Captains Career Course (ECCC) and the Basic Officer Leader Course (BOLC) have been asked to put in their supply side—where they have expertise. Then units are asked to put in their talent requirements—what do they need? Is it a civil engineer? A professional engineer (PE)? The idea is to capture those requirements so we can see what is needed out there. And it's about the Green Pages.

Slide 2 consisted of supply side statements that came from the young officers from ECCC and BOLC. For example, "Explosive hazard team leader in Task Force Troy. Taught Counter-IED and tactical...." Another student wrote, "Prior experience... Project Manager...DC /Baltimore metro area...internationally. Experience with federal and government...." "That's a lot of talent right there that we would have never known about," he said. "That's what we want to capture: What's the talent out there?"

Slide 3 concerned how we match up the talent with the needs. "We're actually going to fill 31 officer positions out of these classes in session right now, based on Green Pages," he said. "We're running a pilot that maybe the Army eventually will go to. Do we have the edge? This is a place where we have a chance to be on the cutting edge—matching talent with needs and requirements."

"I think that if you're going to have a great organization, everyone has to feel as if he contributes," Van Antwerp said. "So we also took a little survey as we were doing this talent input. We asked 'How important is it that the Army treats you as a unique individual?' Ninety-one percent said that it is 'very important' or 'important.' 'How important is it that units provide detailed descriptions of their job requirements?' Ninety-seven percent said they want to know what they are getting into."

Slide 4 contained two other questions: "What is most important to you when looking for your next job assignment?" To most of the young officers, it was "the job." The second question was "What am I going to do next?" Van Antwerp thinks that we're going to have an interesting dilemma: Units are beginning to have longer dwell time between deployments, but there are young people coming up who are saying, "I want to go—I want to be part of this fight; that's why I came in." "So we have to get this right. We want to treat them as unique individuals, and we want to match up with their positions. We're going to give them a lot of say in this, but that's where we're headed. It's all about selecting the right people and getting them in the right positions."

"There are a lot of ambiguities out there," he continued. "Could we prepare them better? I think we have to be listening to this group and bring them on our team and do the development—count on the School for a lot of that, but over on the USACE side, we have $45 billion worth of projects. We need to get our young officers and NCOs over into the Corps for a period of time. What we do well is project management, and we do contracting well. If you're in-theater and you have funds for a project, you need to be able to manage projects so you'll be better equipped. So we have to work this part together. That's about the *disciplined people* part."

"Now let's talk about *disciplined thought*," Van Antwerp said. Then he asked BG BryanWatson, Engineer School Commandant, to talk about the *disciplined thought* he's putting into the School, on how we might train our officers in the future.

BG Watson said that to train officers in the future, we have to recognize that they're unique—that they all come with different education and different training. "However," he said, "we have a one-size-fits-all approach to how we train our officers and NCOs. And we're not even giving them credit for their previous education when they come into the Corps or when they come into the Captains Career Course for a second assignment." He said that Soldiers who are going from a construction outfit to a sapper outfit, or vice versa, are given the same instruction. And so they begin to see less relevance. But now the School is looking at how to take a university approach—really put three people in charge of tailoring that program:

- *Former commander.* Let the former commander help the Soldier see where his or her weakness is and tailor the program. That's part of Green Pages.
- *Future commander.* This is the one who will get the Soldier. Can the commander tell us what the Soldier needs to be trained in so we can use that to tailor the program?
- *Soldier.* What is that person's passion? Where does the Soldier see his or her own strengths and weaknesses? That has to figure largely in the program.

Van Antwerp thanked BG Watson and commented that one thing the Commandant mentioned was passion. "Green Pages isn't just sticking you in a hole because on paper it looks like you fit," he said. "There's also that other piece. Because what does passion do to your talent? It energizes it."

"Okay," he said, "that's disciplined thought going into the School. Let me tell you a little bit about disciplined thought in USACE. First, how do we eliminate the backlog of maintenance or repair? That's a big deal for us. One of the other things to be thinking about is that we hired 8,213 people last year from outside the Corps. I'm so proud that we're building the Corps to last. About 3,000 of those new people came pretty much out of college or what we would call "early entry." And we got a lot of journey people. It takes a lot of disciplined thought on how to bring new people in. Just like a unit commander: How do you bring new troops into the unit when you have a busload of people coming out of advanced individual training (AIT)? They get shipped to your unit during reset, and you don't have your NCOs yet—How do you do it? How do you bring them into your culture?

Van Antwerp remarked that one of the unique things we're finding is that the new people set up their own classes—in a way. "And I would say the same thing happens in the troop unit," he added. "When you get a busload of troops, they identify with each other. They're all in the same boat. There's some teamwork there that I think is good. Before, they might have been isolated—single replacements coming in, and they're in their barracks room, and they don't fit. Now they fit, because there's another 50 just like them right there. But how do you bring those 50 people in? That takes disciplined thought."

He said that the last thing he wanted to talk about was *disciplined action*. "*Disciplined action* means how do you execute a $45-billion program? How do you, on the tactical side, get your units ready so that you can do the mission you've been given? That's where leaders come in—you have to know what your plan is and then how to execute that plan."

"Everybody needs somebody to come alongside them," he said. "We know in the Corps that each of these 8,200-plus new people has a sponsor, everyone is being brought online, and the way we're growing our force is that we're getting them out to get experience. And when they're on a job site to watch work being performed—such as a lock repair—it becomes a classroom. If we think like that, we'll have this force long into the future."

"Thank you very much," he said in closing. "This has been a privilege—a 'get-to'—for me. I love being with this Regiment—this tribe—as BG Watson calls it. And we need to continue to grow the tribe. The country needs 160,000 engineers to graduate from our universities and come to work in our industries and with *us*. Last year, we graduated 75,000. So the challenge is there: We need great engineers. But the *Building Great Engineers* campaign is not just for us—this is for America!"

Ms. Bridges, managing editor of the Engineer Professional Bulletin, has been a member of the bulletin staff for almost 16 years. A former recipient of the Secretary of the Army's Editor of the Year Award, she holds a bachelor's from Missouri State University, Springfield, Missouri.

Endnotes

[1] Jim C. Collins, *Good to Great*, Harper Business: New York, 2001, p.12.

[2] Collins, pp. 90–119.

[3] A personnel tool designed to display an individual's talents, experience, and most desired assignments beyond current capabilities. Rather than contracting this initiative, Army Knowledge Online (AKO) is improving the "My Profile" section, which will become the foundation of the Green Pages. Supplied with this additional data, the Human Resources Command will be better informed in selecting the most qualified individuals for available positions or for consultation or reachback support.

[4] An employee directory originally designed to replace IBM's telephone directory. It is now used to find the right people to get a job done. <*http://www.intranetjournal.com/articles/200209/pij_09_25_02a.html*>, accessed 14 August 2010.

[5] Collins.

(*"Clear the Way," continued from page 2*)

LOE #4: Develop Engineer Capabilities in Support of Full Spectrum Operations (FSO)

DP 4-02: Consolidate FM 3-34, Engineer Operations. Rewrite an engineer keystone manual incorporating the engineer framework of the four lines of engineer support:

- Assure mobility
- Enhance protection
- Enable expeditionary logistics
- Build capacity

In addition, influence paradigm shift from functions to disciplines.

DP 4-04: Implement the Brigade Combat Team (BCT) Engineer Battalion. Implement a major change in Army force structure that gives every BCT and engineer battalion headquarters one combat engineer company and one construction company organic.

DP 4-21: Transition Operational Need Statement (ONS) Equipment to Programs of Record (PORs). Identify ONS equipment/capabilities, in particular improvised explosive device defeat (IEDD) equipment that has been developed and procured for the current fight. Determine what equipment needs to become enduring equipment in engineer tables of organization and equipment (TOEs) and get it transitioned to official Army programs so we can train them in United States Army Training and Doctrine (TRADOC) schools.

LOE #5: Enhance Sense of Regiment

DP 5-02: Establish a Wounded Sapper Program. Establish a program that helps wounded engineers make transitions and get further education, employment, and other life services.

DP 5-06: Renovate the Engineer Museum. Develop a museum program capable of educating and inspiring members of the Regiment and preserving engineer artifacts in preparation for certification.

As I said, this is not the full list of DPs and only gives a sample of the main focus areas for this year's efforts. I can't emphasize enough that this has to be YOUR Regimental Campaign Plan; YOU have to be an active participant in Achieving the Vision; YOU have to fulfill your responsibilities within this profession and shape the debate about the future and the decisions we will make.

Lead to Serve. Essayons!

BUILDING GREAT ENGINEERS SUCCESS

By Captain Joshua A. Morris and Lieutenant Colonel Phillip Kaufmann

Beginning with the American Revolution, our nation has relied on engineer leaders to develop plans and marshal resources to overcome the most serious challenges and threats to our society. In the early days of the republic, this included surveys for roads and canals to carve a transportation infrastructure where there was once only wilderness. Later, it added railroad surveys and flood control to further harness the nation's resources. At the same time, as the United States fought in one conflict after another, engineers facilitated the movement of friendly forces; impeded the movement of enemy forces; and built infrastructure that was needed to sustain the force. Their accomplishments ranged from the Alaska–Canada (Alcan) Highway (now called the Alaska Highway) and the Ledo Road to the Manhattan Project, which developed the atomic bomb. Today, engineer tools have changed, but not our basic mission.

In order to maintain and build on the unstoppable momentum of the Engineer Corps, we developed the *Building Great Engineers (BGE)* initiative to create and sustain engineer leaders who are able to assess tasks and challenges, develop plans to accomplish those missions, and assemble the resources needed to achieve success. Realization of the Engineer Regimental Campaign Plan then came about as we realized success in *BGE* and refined our aim point. More important, investments in people, training and education, and leader development were interwoven with our campaign plan lines of effort as a means of maintaining successful momentum experienced with *BGE* (see figure on page 12).

Achieving Success

The *BGE* initiative began in 2008 after the need was identified for people of great character and values who are fit, tough, smart, adaptive, energetic, and committed to the cause. This "cradle-to-grave" approach focused on the development and management of our most precious resource—people. Five focal points have been the drivers for success: accessions, training and education, employment, retention, and strategic communications.

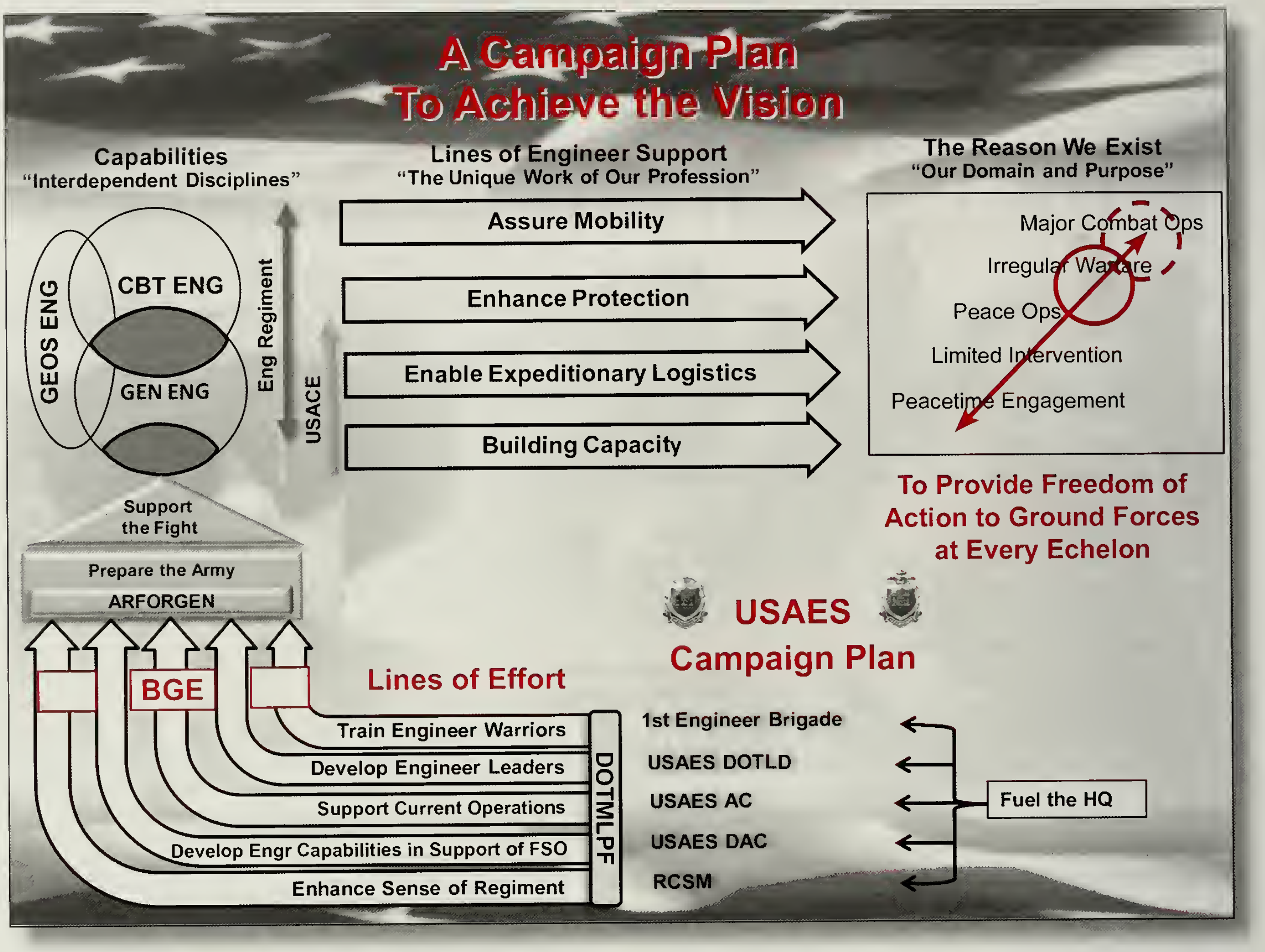
Accessions

As a key starting point, our accessions efforts have included dialogue and engagements with both current and potential engineers. A healthy professional debate about our future from leaders (young and old), officers, warrant officers, and noncommissioned officers across the Engineer Regiment helped add to the momentum. We have seen an 18 percent increase in the number of degreed engineers accessed into the Regiment (from 38 to 56 percent) in the past year. Reserve Officer Training Corps (ROTC) contributions are now 43 percent degreed engineers, and West Point contributions are 70 percent degreed engineers. Our Engineer Personnel Proponency Office (EPPO) continues to engage selected universities with heavy engineer and math degree programs. Their recent accession efforts included Warrior Forge, West Point Tailgate, senior leader panels, and engineer professional organizations. We are anticipating additional positive movement in expanding visibility of the Engineer Regiment by providing opportunities for cadets to work with the United States Army Corps of Engineers (USACE) and visit Fort Leonard Wood, Missouri, to focus on understanding engineer educational development from private to noncommissioned officer to officer. With these efforts, we expect to see additional movement toward increasing the number of degreed engineers in the Regiment.

> ***"The BGE initiative began in 2008 after the need was identified for people of great character and values who are fit, tough, smart, adaptive, energetic, and committed to the cause."***

Training and Education

We have made remarkable strides in maximizing learning effectiveness by working toward a university approach model to training delivery. Other initiatives include the Virtual Battlespace System (VBS2™) development versus PowerPoint briefing presentations, Engineer Captains Career Course (ECCC) and Engineer Basic Officer Leader Course (EBOLC) redesign, joint assault bridge (JAB) and assault breacher vehicle (ABV) training, the Sapper Campus, counter-improvised explosive device (C-IED) training



institutionalization, and opportunities for the Prime Power School move and potential for the Geospatial School move to Fort Leonard Wood. The integration of VBS2 into our classrooms will revolutionize instruction by making it more interactive with our students. Key to our continued success will be a focus on collaborative problem-solving skills in which instructors facilitate rather than lecture, including peer-to-peer learning, given the enormous amount of operational experience that our leaders have. The bottom line can be expressed in three words: rigor, relevance, and relationships.

Employment

In addition to training, we have worked to better employ the existing talent in the Regiment. There has been solid progress toward increasing employment visibility through our Green Pages initiative that better aligns officer supply and demand. As a result, the Army—and specifically our Regiment—will gain visibility of officers' skill sets, education, life experience, and other background information that is currently not maintained in legacy Army personnel systems. In essence, Green Pages matches the talent it needs (demands) with the talent it already has (supply). Officers communicate their desired future assignments and then search all available positions. More important, officers can judge the emerging skill demands and develop themselves to better meet them. In addition, we have finally established skill identifiers to support career development, officer tracking, and talent management as part of a military occupational change of structure (MOCS) proposal being submitted through the United States Army Training and Doctrine Command (TRADOC) to the Department of the Army in October 2010. Officers will be managed and assigned to coded positions, based on officer talents (skill identifiers), thus allowing our Regiment to fill coded positions with officers who possess the right mix of skills.

Not only have we worked to better align officer talent but also to align engineering capabilities with needs across the full spectrum of engineer operations. This includes the recently approved implementation of the brigade engineer battalion into maneuver brigade combat teams (BCTs). This will provide needed problem-solving ability to maneuver forces at the brigade level. In addition, we have worked to return selected leaders with operational experience back to the United States Army Engineer School (USAES) and USACE to support Warfighter function forums. We have also begun the military working dog initiative to further provide deployed engineer units with the capabilities to successfully complete their mission.

Retention

Relationships are key, even more so in the retention effort. As we work toward linking career advisors and mentors with junior officers, we are seeking discussions on specific coaching and career or technical advice and engineer-specific professional development opportunities. Branch mentorship for junior engineers—especially "outlying" officers who work outside the normal engineer chain of command—remains a tough challenge. The framework for these discussions lines up along Active Army, United States Army Reserve, and Army National Guard experiences and footprints. Engineer brigades, battalions, and districts focus on the active duty portion. First Army East and West Regions handle Reserve coverage, and National Guard coverage is naturally aligned by states.

We have also leveraged higher education with the Missouri University of Science and Technology (MS&T) engineering master's degree program as a means of increasing officer retention. Notably, MS&T recently opened an explosives engineering master's degree program, for which many of our officers qualify. The MS&T explosives engineering certificate program is designed to provide formalized education in the area of explosives engineering. Students are exposed to the theoretical and practical approaches of explosives engineering and learn analysis and design of explosives-related systems—both natural and man-made structure effects. The explosives engineering certificate program is open to all persons holding a bachelor of science, master of science, or doctoral degree and who have a minimum of 12 months of post-bachelor of science professional employment experience.

Strategic Communications

We have made enormous progress in strategic communications. This continues to enhance our sense of Regiment by strengthening our ties with engineer professional organizations, renovating our Engineer Museum, and establishing wounded engineer and fallen engineer programs. Of particular note is our "open-arms" commitment to engineer veteran reunions. During one recent event, the 299th Engineer Battalion of Vietnam, the Defenders of Dak To, traded war stories with current students of the ECCC, Advanced Leader's Course (ALC), and EBOLC.

Throughout the last few years we have also implemented several knowledge management mediums:

- USAES Public Website: Public face of USAES. Contains historical and command information, links to USAES resources (public and protected), and current events and announcements appropriate for public consumption.
- Battle Command Knowledge System (BCKS) Engieer Forum: Contains engineer-related discussion forums and document storage. Requires Army Knowledge Online (AKO)/Defense Knowledge Online (DKO) credentials to access.
- Engineer School Knowledge Network (ESKN): Primary portal to essential engineer resources. Requires AKO/DKO credentials to access. Contains document storage, links, announcements, and request-for-information features. ESKN was recently redesigned to better suit the needs of engineers (replaced Sapper 411).
- *Engineer Blast*: Monthly newsletter from the Army Chief of Engineers. USAES contributes updates and news related to training and upcoming events.
- Commandant's Forum (milBook): Site for collaboration with senior engineer leaders from around the globe.
- Other milBook Groups: Senior Engineer Warrant Officer, EPPO, USAES Historian, and Engineer Force (ENFORCE). Requires AKO/DKO credentials to access.
- USACE Reachback: Requests for information and support provided by Engineer Research and Development Center (ERDC).

All of the above can be accessed by visiting ESKN at *<https://www.us.army.mil/suite/page/637460>*.

Challenges

Along with this progress, there are still challenges. In our accessions efforts, we have found that geographic and expanded recruitment areas are both an opportunity and a test of resources. We are always looking for assistance with these engagement opportunities. Accessions estimates must also take into account that there is an increasing percentage of new lieutenants coming from Officer Candidate School (OCS) (approximately 23 percent of our incoming officers over the last eight years), and the most common degree for OCS is criminal justice. Given that OCS branching is one of the areas that we least control, we must aggressively seek a means of providing math and science educational opportunities to our enlisted Soldiers who may become officer candidates. Incentives for professional development, such as project management professional (PMP) and professional engineer (PE) preparation and test fee and annual fee reimbursement, would greatly help our retention efforts. Education opportunities for USACE-sponsored courses is difficult to obtain but key to *BGE* leader training and education. Our pursuit of Army Learning Concept (ALC) 2015 objectives (temporary duty [TDY] modules) to support Army Force Generation (ARFORGEN) has the potential to increase the opportunity for university-style "credits" for resident and distributed learning courses available in USACE, Department of the Army, and Department of Defense. Finally, we are broadening assignment and reemployment of wounded warriors in the Regiment. Although Fort Leonard Wood is rapidly expanding its medical facilities, it is still unable to meet the needs of many of our wounded warriors. Nonetheless, we are now working on providing them with opportunities at USACE project sites near their hometown and necessary medical facilities. All of these challenges are part of our continuing efforts to build great engineers.

(Continued on page 19)

2010 Best Sapper Competition

By Mr. Luke Waack

One of the toughest challenges an engineer Soldier, or sapper, could ever have is vying in and winning the Best Sapper Competition—which in 2010 was a six-day, three-phase event at Fort Leonard Wood, Missouri, covering the full spectrum of engineer operations and infantry tasks. Moving more than 50 miles on foot, the sappers were on nearly continuous operations, with little "down time" between events that ran the gamut of physical and mental challenges. The competition began with two-person teams performing the most repetitions possible of push-ups, sit-ups, and pull-ups in 15 minutes—five minutes in each category—then continued with sappers running more than four miles in Army combat uniform and interceptor body armor vest and carrying a dummy M4 carbine.

Photo by Luke Waack

Photo by Luke Waack

Above: Second Lieutenants Jonathan Kralick (right) and Jeffrey Laughlin, 82d Airborne Division and 20th Engineer Battalion, respectively, Fort Bragg, North Carolina, move a stump weighing hundreds of pounds during the Log Cut and Carry event of the X-Mile Run and the final phase of the 2010 Best Sapper Competition. Kralick and Laughlin took second place.

Left: Captain Joseph Byrnes (left) and Captain Jason Castro, both Charlie Company, 554th Engineer Battalion, tie up their poncho raft at TA 250, before helo-casting. Byrnes and Castro went on to win the 2010 Best Sapper Competition.

Photo by Visual Information Center

Second Lieutenant Jay Beeman (right) and Captain James Gibbs (left), 11th Engineer Battalion, Fort Benning, Georgia, took third place in the 2010 Best Sapper Competition.

After the first day of challenges, ranging from knot tying to manual breaching of obstacles to evacuate a casualty, the field was narrowed to 20 teams. After the second day, only 10 teams were left. Of those teams, only one could be named Best Sapper.

A previous Best Sapper Competition winner returned to the champion's stage on 21 April at Fort Leonard Wood during the 2010 ENFORCE Conference. Captain Joseph K. Byrnes was a winner in the 2006 competition. He and his teammate this year, Captain Jason D. Castro, were both from Charlie Company, 554th Engineer Battalion, Fort Leonard Wood, at the time of the competition. They beat out 28 teams for the title of "Best Sapper" after more than 50 hours of almost nonstop physical and mental exercise in dozens of Soldier and engineer-specific skills challenges. The teammates used the Warrior Ethos as a guiding principle. They said that they treated the competition as a mission—they received a mission to conduct a three-day competition, gave it everything they had, and left nothing on the course. By working together, they were able to figure out what each of them was good at, and then they came up with a process to eliminate mistakes. They believe that was the key to their success.

Of the six phases of the competition, the pair won the demolition and the land navigation portions. For being named best sappers, they were awarded the Army Meritorious Service Medal and the Army Engineer Association's Bronze deFleury Medal.

The second place team, Second Lieutenant Jonathan Kralick, 82d Airborne Division, Fort Bragg, North Carolina, and Second Lieutenant Jeffrey Laughlin, 20th Engineer Brigade, Fort Bragg, won the road march and Sapper Stakes phases of the competition and earned Army Commendation Medals.

Captain James Gibbs and Second Lieutenant Jay Beeman, 11th Engineer Battalion, Fort Benning, Georgia, took third place and were awarded Army Achievement Medals. Captain David Vasquez and First Lieutenant Brett Fuller, 54th Engineer Battalion, Bamberg, Germany, won the nonstandard physical fitness test. First Lieutenants Brandon Darroch and Stephen Kraus, 326th Engineer Battalion, Fort Campbell, Kentucky, won the X-Mile Run phase of the competition.

When asked why he entered the competition, one captain replied, "Pride, more than anything. Because I believe there's no better Soldier than an engineer Soldier, and if you're the best here, you're the best Soldier—period."

Mr. Waack was a staff writer and assistant editor for the Fort Leonard Wood Guidon, as well as the beat reporter for the fort's engineers, when he wrote this article. He is currently the editor of the Arctic Warrior, the authorized newspaper for Joint Base Elmendorf-Richardson, Alaska. Before joining the Guidon, Mr. Waack was an Army broadcaster for six years and served in Texas, Italy, and Afghanistan.

Regimental Awards

Photo by Visual Information Center

Each year we recognize the best engineer company, lieutenant, warrant officer, noncommissioned officer, and enlisted Soldier—in each of the components—for outstanding contributions and service to our Regiment and Army. Every engineer unit in the Regiment can submit the name and achievements of its best of the best to compete in these distinguished award competitions. Only the finest engineer companies and Soldiers are selected as recipients of these awards. The Soldiers will carry throughout their careers the distinction and recognition of being the Engineer Branch's best and brightest Soldiers and leaders. Following are the results of the 2009 selection boards for the Itschner, Outstanding Engineer Platoon Leader (Grizzly), and Outstanding Engineer Warrant Officer Awards, the Sturgis Medal, and the Van Autreve Award:

Active Army

Itschner Award: Bravo Company, 9th Engineer Battalion, 172d Infantry Brigade, Grafenwoehr, Germany.

Outstanding Engineer Platoon Leader (Grizzly) Award: United States Army Europe (USAREUR) nominee, First Lieutenant Brent J. Johnson, 500th Engineer Company, 15th Engineer Battalion, Schweinfurt, Germany.

Outstanding Engineer Warrant Officer Award: United States Army Forces Command (FORSCOM) nominee, Warrant Officer Two David M. Reeves, Headquarters Company, 37th Engineer Battalion, 20th Engineer Brigade, Fort Bragg, North Carolina.

Sturgis Medal: USAREUR nominee, Sergeant First Class Ricardo Ranger, Charlie Company, 40th Engineer Battalion, Baumholder, Germany.

Van Autreve Award: FORSCOM nominee, Specialist Michael A. Tellez, 104th Engineer Company, 62d Engineer Battalion, 36th Engineer Brigade, Fort Hood, Texas.

LTG John W. Morris Outstanding Civilian of the Year Award: United States Army Corps of Engineers (USACE) nominee, Mr. Curtis A. Heckelman, United States Army Corps of Engineers.

United States Army Reserve

Itschner Award: 321st Engineer Detachment, 844th Engineer Battalion, Bethlehem, Georgia.

Outstanding Engineer Platoon Leader (Grizzly) Award: First Lieutenant Jennifer L. Barker, 770th Engineer Company, Penn Yan, New York.

Outstanding Engineer Warrant Officer Award: Warrant Officer Two Timothy L. Conley, Assistant Chief of Staff for Installation Management (ACSIM), Washington, D.C.

Sturgis Medal: Staff Sergeant Jason L. Moldan, 401st Engineer Company, 489th Engineer Battalion, Oklahoma City, Oklahoma.

Van Autreve Award: Specialist Zachary Stenzel, 401st Engineer Company, 489th Engineer Battalion, Oklahoma City, Oklahoma.

Army National Guard

Itschner Award: Headquarters and Headquarters Company, 220th Engineer Company, Missouri Army National Guard, Festus, Missouri.

Outstanding Engineer Platoon Leader (Grizzly) Award: First Lieutenant Jason R. Davis, 220th Engineer Company, Missouri Army National Guard, Festus, Missouri.

Outstanding Engineer Warrant Officer Award: No nomination.

Sturgis Medal: Sergeant First Class John E. Roberts, 220th Engineer Company, Missouri Army National Guard, Festus, Missouri.

Van Autreve Award: Specialist Ethan S. Coulson, 220th Engineer Company, Missouri Army National Guard, Festus, Missouri.

All of the nominees represented their major commands with the highest professionalism and dedication to the Engineer Corps's vision and deserve our highest praise. The award recipients were recognized at ENFORCE 2010 at Fort Leonard Wood, Missouri.

Regimental Command Council

By Mr. James R. Rowan

The Regimental Command Council (RCC) conducted on 22 April during ENFORCE 2010 at Fort Leonard Wood, Missouri, may have seemed like a new event to some people. In actuality, the RCC is the new name for the combined Council of Colonels and Council of Command Sergeants Major (CSMs). Historically, these have been two separate forums but, based on comments from the Council of CSMs in April 2009, they were combined during ENFORCE 2010. The United States Army Engineer School Commandant hosts this event twice a year: once during ENFORCE and once during the fall. This year, the Regimental Chief Warrant Officer elected to hold a separate Council of Warrant Officers to home in on some of the unique officer issues the Regiment is facing.

Regimental Command Council during ENFORCE 2010

The target audience for the RCC is brigade-level commanders and CSMs; colonel-level district commanders; topographic engineering center chiefs of staff and deputy chiefs of staff for operations and plans; key engineer billets at Headquarters, Department of the Army; Army Service Component Command engineers; and the doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) domain chiefs. Approximately 65 people attended the RCC at ENFORCE 2010.

The key briefings provided during the RCC included—

- Commandant's priorities and the Regimental Campaign Plan.
- Update on the brigade engineer battalion.
- Engineer brigade training and certification.
- Counter-improvised explosive device (C-IED) threat briefing (classified session).
- United States Army Forces Command issues/sourcing.
- Unit history programs and requirements.
- Proposed Engineer Captains Career Course changes.
- Geospatial intelligence and geospatial update.

All of these briefings are available for viewing at the Army Knowledge Online (AKO) password-protected Engineer School Knowledge Network (ESKN) website. The feedback from briefing attendees was overwhelmingly positive, with many expressing a desire to make it a 1 1/2- or 2-day program at future ENFORCE conferences.

The next meeting of the RCC is scheduled for 17–18 September at the North Dakota Army National Guard's Regional Training Institute at Devils Lake, North Dakota, one of the premier engineer training sites in the country. The event will have the same target audience listed previously, along with engineer chief warrant officers five (CW5). This will be a great opportunity to catch up on the latest status of the Regimental Campaign Plan and other key initiatives that are underway. Continue to follow the *Engineer Blast* (a bimonthly e-mail newsletter), the Commandant's Forum,[1] and the ESKN site for additional information and registration instructions for the September RCC. For more information about the RCC, contact the author at <*james.rowan@us.army.mil*>.

Mr. Rowan is the Deputy Commandant, United States Army Engineer School. Previously, he served as the Assistant Technical Director for Military Engineering at the United States Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi. Other key duty positions include Commander, ERDC; Commander, 1st Engineer Brigade; Commander, 54th Engineer Battalion; and Commander, 16th Engineer Battalion. A retired United States Army colonel, he has served in Operation Iraqi Freedom both as a military officer and a civilian.

Endnote

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[1] The Commandant's Forum is a by-invitation, web-based discussion board for senior leaders of the Engineer Regiment. All colonels and above have been invited through their AKO e-mail accounts to participate. Anyone who has not received this invitation can contact Mr. Doug Fowler at <*douglas.fowler@us.army.mil*>.

The Regiment Engages With Universities

By *Major Karl Hatala*

In the fall of 2009, the United States Army Engineer Personnel Proponency Office (EPPO) initiated a series of university engagements to recruit more degreed engineers into the Engineer Regiment. This effort supports the *Building Great Engineers* campaign, which established increasing the accession rate of degreed engineers as one of its goals. The EPPO team specifically targets schools with reputable engineering programs so that team members can directly engage with cadets and other students majoring in engineering. Throughout these engagements, the team also encourages high-quality students who are not pursuing engineering degrees to consider joining the Engineer Regiment.

Each engagement consists of briefings to small groups of students to inform them of the diverse and unique capabilities provided by the Engineer Regiment and the wide range of opportunities available to those who serve in it. Though the EPPO team presents some of the same information to cadets between their junior and senior years during annual branch orientation days at Fort Lewis, Washington, and West Point, New York, these new engagements enable the team to interact with students in their freshman and sophomore years. By engaging students earlier in their university experience, the EPPO team gives them more time to make more informed decisions about what path they will pursue following graduation.

A representative of the United States Army Corps of Engineers talks to ROTC cadets about opportunities in the Engineer Regiment.

These university engagements also enable the EPPO team to serve as engineer scouts, gathering information that paints a better picture of the challenges to the accession of more degreed engineers into the Engineer Regiment. For example, The Pennsylvania State University Reserve Officer Training Corps (ROTC) faculty informed the team that some engineering students who want to serve in the Engineer Regiment might be unable to do so because of the way the accession process works. The ROTC faculty pointed out that a cadet who earns a lower grade point average in a demanding engineering curriculum probably will not be as competitive for an Active Army engineer branch slot as a cadet who earns a higher grade point average in a less academically challenging nonengineering curriculum.

The effectiveness of this university engagement effort may not be easy to measure immediately, but based on the number of students who approached the team during the informal question-and-answer sessions following the briefings, it appears to be a worthwhile effort. However, it faces some challenges. One such challenge is that the EPPO university engagement team currently consists of just three senior noncommissioned officers (NCOs). These NCOs represent the Engineer Regiment in a professional manner, but they must rely on augmentation to provide an officer's perspective during the engagements. The EPPO team has sought augmentation from serving members of the Engineer Regiment who are alumni of the universities visited, but participation has been limited, presumably due to ongoing operational requirements. Perhaps a habitual relationship could be established with the Engineer Captains Career Course and the Command and General Staff College to seek officers who can participate in this effort.

Overall, the strategy to engage with universities appears to be a good one that may only require refinement to yield greater benefits. For example, as relationships with universities develop, ideas or opportunities may be discovered that will help advance other parts of the *Building Great Engineers* campaign. The engagements could also promote greater understanding between military engineers and their civilian counterparts. At a minimum, they will offer opportunities to meet prospective members of the Engineer Regiment and provide a better understanding of how to shape it.

Major Hatala recently completed Intermediate Level Education at the United States Army Command and General Staff College, Fort Leavenworth, Kansas, and is now serving with the 10th Mountain Division (Light Infantry) at Fort Drum, New York. He holds a bachelor's in civil engineering from The Pennsylvania State University.

("Building Great Engineers," continued from page 13)

Conclusions

More than any other branch, engineers provide that bridge between what the maneuver force is able to achieve now and what the maneuver force needs to achieve tomorrow. When the maneuver commander calls for his engineer, that engineer must be a leader who can tackle any challenge—whether it is a question of clearing obstacles, shielding allied forces, or restoring infrastructure. To develop such a leader, it is critical that the Engineer Regiment continues to build on the momentum of the *BGE* initiative through five key approaches:

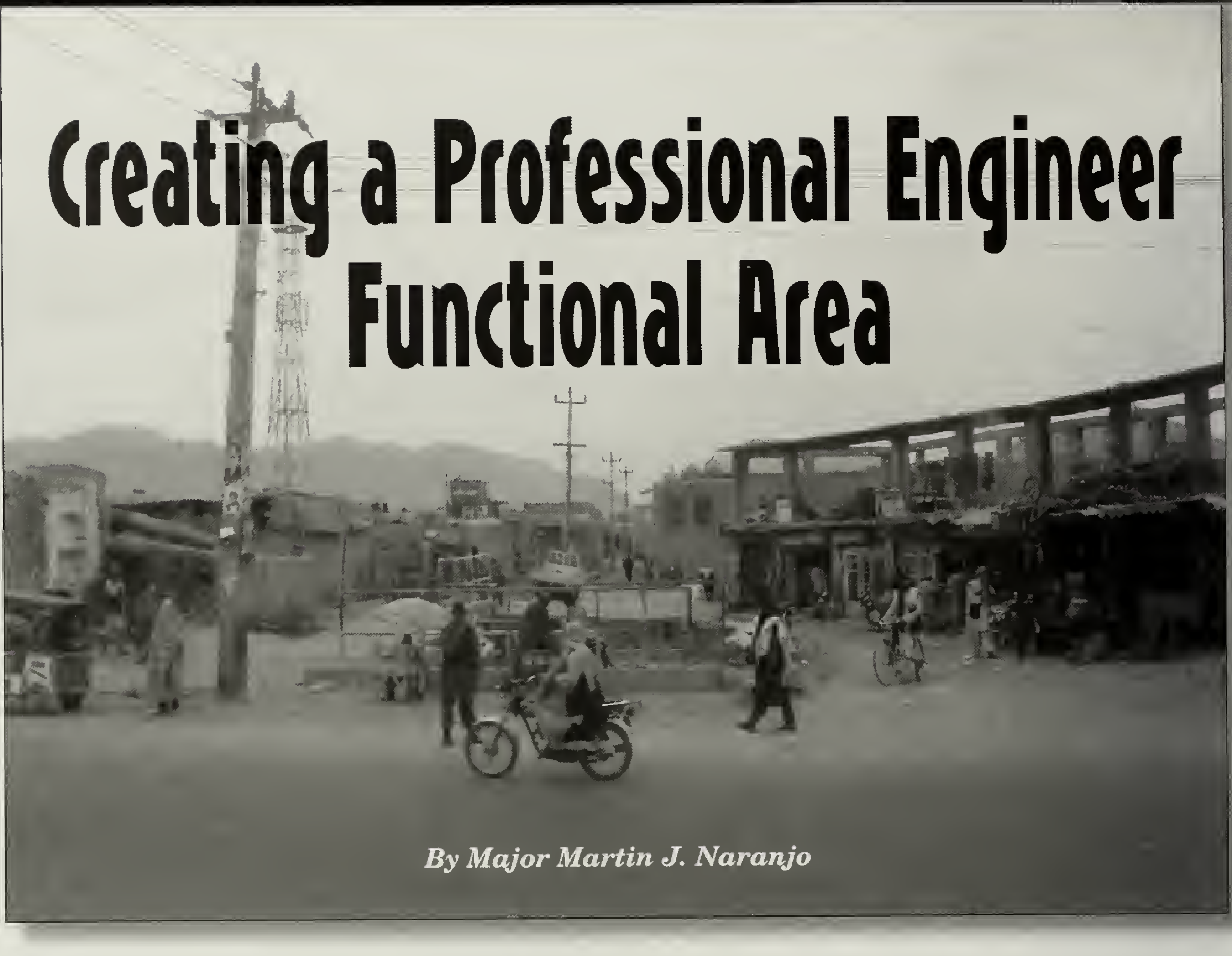
- Continue to access talented and motivated individuals for their entry into the Regiment by facilitating the move of potential engineers into the Engineer Corps.
- Continue educational opportunities—such as the VBS2 and our partnership with MS&T.
- Move programs like Green Pages from the trial stage into full implementation to increase market transparency and better employ our leaders with special skill sets where they are needed most.
- Seek a return on the Regiment's investment by retaining the talent we have fostered. To do this, senior leaders must take ownership of the branch mentorship framework and the responsibility for advising junior leaders. Use of existing continuing education opportunities is also a key to retention.
- Continue to enhance the sense of Regiment, not only by reaching out through knowledge management mediums but—more important—by bringing together our veterans with today's Soldiers and looking after the welfare of our wounded warriors as they have looked after the welfare of the nation.

The unstoppable momentum of these initiatives is the key to ensuring that the engineer becomes the weapon of choice, against even the most unpredictable battlefield obstacles on today's irregular battlefield. As engineers have always been the greatest builders, we must also be builders of the greatest engineers.

Captain Morris is the operations officer for the United States Army Engineer School at Fort Leonard Wood, Missouri. A recent branch transfer from the Infantry, he will attend the Engineer Captains Career Course in October 2011. He holds an associate's in business administration from Franklin University and a bachelor's in history from Columbus State University. He has managed multiple vertical construction projects, including two solar-powered homes.

Lieutenant Colonel Kaufmann has been the Director of Instruction at the United States Army Engineer School at Fort Leonard Wood, Missouri, since the 2008 Building Great Engineers initiative and previously served as Deputy Commander for Gulf Region–North District, Portland District, and Northwestern Division, USACE. He holds a bachelor's in civil engineering and a master's in engineer management from Missouri University of Science and Technology and is a graduate of the United States Army Command and General Staff College.

Creating a Professional Engineer Functional Area



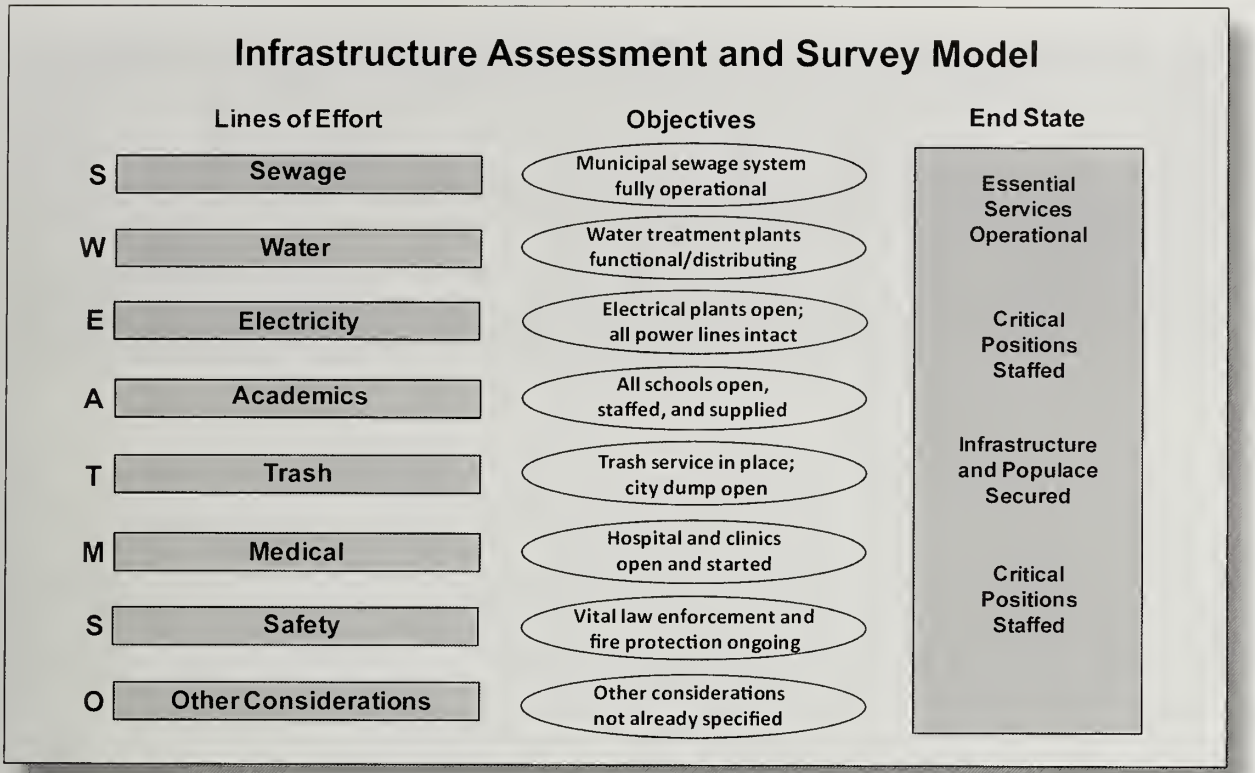
By Major Martin J. Naranjo

During the conflicts in Iraq and Afghanistan, there has been much talk about the need to rebuild the infrastructure of those two nations. Elements of infrastructure have become vital components in stability and counterinsurgency lines of operation. The sewage, water, electricity, academics, trash–medical, safety, and other considerations (SWEAT–MSO) model has provided commanders an outline to address essential services. The mission of designing, building, and repairing a nation's infrastructure is the role of engineers. Joint Publication 3-34, *Engineer Doctrine for Joint Operations*, defines general engineering as "the construction, repair, maintenance, and operation of infrastructure, facilities, lines of communication and bases, terrain modification, and repair." The engineer officer skill set in the United States Army's force structure does not address the need for competent and qualified engineers capable of using their professional knowledge to advise the brigade combat team (BCT) commander on general engineering operations in the current operating environment. The lack of engineer professionals is an important force management problem facing the Engineer Regiment, but a ready pool of engineer advisors and professionals could be created with a minimal increase to the current force structure. This could be done by creating a professional engineer functional area within the operational support career field. By focusing on education, experience, and professional credentials, it would provide officers with the necessary skills to act as more competent advisors and planners when dealing with reconstruction and infrastructure.

Educating Engineer Officers

The current process of educating engineer officers has proven less than perfect in meeting the need for general engineering experts. Far too many engineer officers have no formal training in civil or construction engineering beyond what is taught in the Basic Officer Leadership Course. Much engineer expertise exists in the forward engineer support teams and provincial reconstruction teams. What we lack is a single subject matter expert within the BCT who can provide general engineering advice to the commander on how best to use all the engineering capability within the BCT.

The current engineer Officer Education System should provide a wider breadth of the knowledge needed to plan general engineering operations. To better develop this skill, the Army should create a new professional engineer functional area that would allow a separate engineer career path based on education, training, and experience. Before entering this functional area, officers should serve at the company level in their specific branch. As in other functional areas, officers with an engineering degree could apply to enter a career path as a major to hone their professional engineer skills. If accepted into the functional area, those who hadn't yet done so could begin the process of attaining their professional engineer license by taking the National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering exam. Once


Infrastructure Assessment and Survey Model

Lines of Effort
Objectives
End State
S Sewage
Municipal sewage system fully operational
W Water
Water treatment plants functional/distributing
E Electricity
Electrical plants open; all power lines intact
A Academics
All schools open, staffed, and supplied
T Trash
Trash service in place; city dump open
M Medical
Hospital and clinics open and started
S Safety
Vital law enforcement and fire protection ongoing
O Other Considerations
Other considerations not already specified
Essential Services Operational
Critical Positions Staffed
Infrastructure and Populace Secured
Critical Positions Staffed

officers enter this functional area, they should attend Advanced Civil Schooling to receive an advanced degree in engineering management, civil engineering, construction engineering, or other relevant discipline. Officers could then move into a utilization tour on an installation or with the United States Army Corps of Engineers to develop their base of knowledge with construction, contracting, and infrastructure. This career track could be very appealing to cadets weighing their options during the accessions process.

Gaining Experience and Credibility

It takes many years of study and experience to develop a competent engineer in the civilian sector. As with many professions, state governing bodies license or register professional engineers based on education, experience, and standardized tests. In a new professional engineer functional area, officers would earn professional accreditation with the support of the Army, much as Army doctors, nurses, and lawyers earn. Based on experience gained at the company level, graduate school, and their utilization tour, officers could apply for professional licensure from their state of choice. They would then have the opportunity to take the NCEES Principles and Practice of Engineering exam. At this stage, officers would have the knowledge, experience, and credibility necessary to advise commanders on general engineering issues.

Incorporating Professional Engineers

To provide BCT commanders with engineer advisors with a strong base of engineer knowledge and skills, a pool of ready professional engineers available in this functional area would be needed. The professional engineer functional area would provide the personnel, but there would also be a need for positions within commands. At the BCT level, a professional engineer could be incorporated into the current staff to offer general engineering advice. At division level and above, doctrine now recognizes the senior engineer advisor as the engineer coordinator. The professional engineer could fill a newly created position subordinate to the coordinator responsible for advising in general engineering operations.

Summary

It might be argued that much of this capability already exists in the force. There is no doubt that engineer professionals currently serving have a lot of the skills and experience necessary to properly advise the commander. What the professional engineer concept provides is a full-time professional engineer on staff who is fully integrated into the headquarters. In the current complex operating environment, competent engineers are more in demand than ever before. We have seen a deficiency in our ability to advise commanders at all levels on issues involving general engineering. The best way to address this deficiency is to create a professional engineer career field. Engineers serving in this functional area would have the ability and credibility to address some of the complex general engineering issues the Army will face in the future.

Major Naranjo is a United States Army Reserve engineer officer attending Intermediate Level Education at the Command and General Staff College, Fort Leavenworth, Kansas. He has deployed twice to Iraq, serving at the tactical and operational levels. He is also a licensed professional engineer in Colorado.

WHAT IT MEANS TO BE A BATTLE BUDDY

By Specialist James V. Dunz

The following story was relayed to me about a Soldier named Eddie. It underscores the importance of Army policy in supporting your battle buddy.

One weekend many years ago when I was a young Soldier, I saw a fellow Soldier (who I soon learned was Eddie) packing all his belongings into his car. It looked as if he were leaving. I thought to myself, Why would anyone be packing up all his stuff? Since we were in the Army, it was not as though we could just go home whenever we wanted to.

As I was watching him, I saw some other Soldiers going toward him. They started picking on him and making fun of him—pushing Eddie around and knocking some things out of his hands. Then they tripped him, and he landed in the dirt. Poor Eddie looked up, and I saw a terrible sadness in his eyes. My heart went out to him. I walked quickly over to him to see if I could help.

As I pulled him to his feet, he looked at me and said, "Thanks." A big smile transformed his face then—one of those smiles that shows real gratitude. I helped him pick up his gear and asked where he was from. I was surprised to learn that he was from my home state and asked him why I had never seen him before. He told me he hadn't been in the Army that long. As we talked, I helped him carry his belongings to his car. Normally, I would not have hung out with a boot private like him, but as it turned out, he was a pretty good guy. In fact, the more I got to know Eddie, the more I liked him. I invited him to hang out with me and some of my friends over the weekend.

On Monday morning, I saw Eddie in the parking lot, taking everything out of his car and back to his room. I stopped him and said, "Eddie, you are going to really build some serious muscles moving all your stuff back and forth like this!" He just laughed and handed me some of it.

Over the next few years, Eddie and I became battle buddies. Even though I left the Army while Eddie continued his Service career, we remained friends. Years later, I was invited to Eddie's retirement ceremony. On that day, Eddie was expected to say a few words. He looked great—one of those guys who really found himself in the military. I was proud of Eddie.

I could see that he was nervous about his speech. So I smacked him on the back and said, "Hey, big guy, you'll be okay!" He looked at me, smiled, and said, "Thanks, battle." He cleared his throat and began: "Retirement is a time to thank those who helped you make it through all the tough years: your parents, your family, even your sergeants—but mostly your friends. I am here to tell all of you that being a battle buddy to someone is the best gift you can give him."

Then Eddie started telling the story of how we first met. He explained that he had planned on taking his life that weekend. He talked of how he had cleaned out his room and carried his stuff to his car, so that his family wouldn't have to do it later. I just sat there, looking at my battle buddy with disbelief. He looked hard at me and gave me a little smile. "Thankfully," he said, "I was saved. My battle buddy, who is here today, saved me from doing the unspeakable." I heard the gasp go through the crowd as he told us all about his weakest moment. I saw his family looking at me and smiling that same grateful smile; not until that moment did I realize its depth.

> ***"We should never underestimate the power of our actions. With one small gesture, we can change a person's outlook.... So what does it mean to be a battle buddy to someone? It could mean saving a life."***

We should never underestimate the power of our actions. With one small gesture, we can change a person's outlook...or frame of reference...or prospects. So what does it mean to be a battle buddy to someone? It could mean

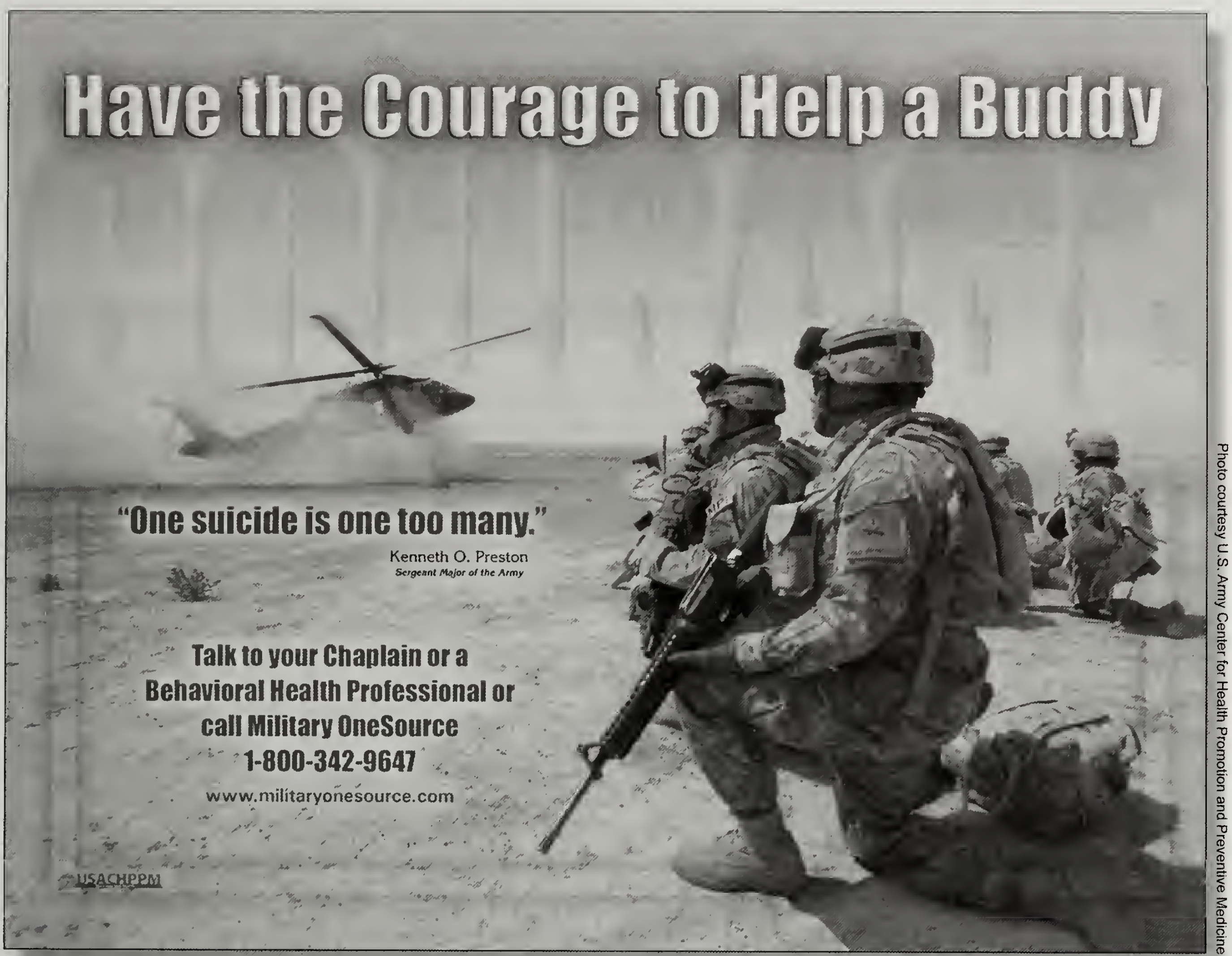

Have the Courage to Help a Buddy
"One suicide is one too many."
Kenneth O. Preston
Sergeant Major of the Army
Talk to your Chaplain or a
Behavioral Health Professional or
call Military OneSource
1-800-342-9647
www.militaryonesource.com
USACHPPM

Photo courtesy U.S. Army Center for Health Promotion and Preventive Medicine

saving a life. So take advantage of every opportunity to make a positive impact on others. You can make a profound difference; just look around and you'll find a way.

Specialist Dunz is a legal clerk with the 94th Engineer Battalion, having reenlisted after 20 years as a civilian. He has deployed to Iraq as an engineer in carpentry/masonry with the 77th Engineer Company. As a civilian before returning to military service, he was a minister helping the homeless for more than 15 years. His main goal is to encourage young Soldiers, and he currently is pursuing a doctrine degree in Christian counseling, to be awarded in 2011.

Note: If you need help, your battle buddy may be your nearest and most valuable source of support. In difficult moments, always be there for your buddy. You can sustain each other through stress, loss, and other trauma by showing you care. If you would like to talk to someone else, call any of the three following hotlines—available 24 hours a day to help you. Just remember, no Soldier stands alone.[1] In the Army's ACE Suicide Intervention Program, the acronym guides actions to take with a buddy to prevent suicide: **ACE** (**A**sk your buddy, **C**are for your buddy, **E**scort your buddy).[2]

- Military OneSource, 1-800-342-9647. Offers 6 free counseling sessions to Service members and their families. <*www.militaryonesource.com*>
- National Suicide Prevention Lifeline, 1-800-273-TALK (8255). Calls are routed to the closest crisis center in your area. <*www.suicidepreventionlifeline.org*>
- National Hopeline Network, 1-800-SUICIDE (784-2433). Calls are connected to the nearest certified crisis center. <*www.hopeline.com*>

Endnotes

[1] U. S. Army Center for Health Promotion and Preventive Medicine, Directorate of Health Promotion and Wellness Suicide Prevention Resources and Services, <*https://www.us.army.mil/suite/portal/index.jsp*>

[2] ACE Suicide Intervention Tipcard, "ACE Suicide Intervention (SI) Program," <*http://phc.amedd.army.mil/home*>

The Theater Engineer Construction Battalion:

General Engineering in Support of the Warfighter

By Lieutenant Colonel Adam S. Roth

The 844th Engineer Battalion, a United States Army Reserve unit headquartered in Knoxville, Tennessee, recently completed a mission as the theater construction battalion in Iraq. This article is germane to the Active Army and Reserve Component, since there were active duty United States Army, United States Air Force, and United States Army National Guard units within Task Force 844 during the deployment. It is hoped that some of the insights of this article will keep a few more Soldiers alive, safe, and trained, while giving the command teams of deploying battalions some peace of mind by learning from the experiences of the 844th.

Conditions

The 844th Engineer Battalion received notification of sourcing for Operation Iraqi Freedom in the spring of 2008, and the first implications of modularity set in with the information that the battalion would not be deploying with its organic subordinate units. The first concern was to establish a commander's vision and conduct a mission analysis with the leadership of the "new" 844th Engineer Battalion, now becoming Task Force 844. The unit deployed to the National Training Center, Fort Irwin, California, in the summer of 2008 as part of Operation Sand Castle to conduct construction operations in a counterinsurgency environment. During that time, the commander's vision and mission statement crystallized. The key to this exercise was the cultivation of relationships and the inculcation of the commander's vision and intent into all subordinates a full year before actual deployment. The battalion developed deployment training guidance that specified all theater-specific leader and Soldier training tasks required for premobilization and set the training azimuth for the task force.

Pre- and Postmobilization Training

The 844th Engineer Battalion and all subordinate units finally came together at the Fort McCoy, Wisconsin, mobilization station in early April 2009 and formally constituted as Task Force 844 after focusing on leader and Soldier tasks at various regional training centers. The key to this event was to create a single identity for the newly formed unit. The second step was to conduct what was referred to as the "Patton briefing." The commander, command sergeant major, chaplain, and command chief warrant officer all conducted briefings on vision, intent, policies, and expectations. This practice would be carried far into the deployment, since the task force would continually be gaining and losing units.

The key to the success of the mobilization training plan was the partnership forged with the leaders of the 181st Infantry Brigade. It allowed the commander's vision to be fully exploited through collective training focused on construction support operations in a counterinsurgency environment. Task Force 844 was composed of both horizontal and vertical formations that required technical training for plumbers, carpenters, electricians, and horizontal military occupational specialties (MOSs). The 181st was able to conduct training with five separate mobile training teams through the United States Army Engineer School, Fort Leonard Wood, Missouri, yielding huge dividends. In collective training, the brigade's preparation of construction projects allowed the task force to construct more than 10 Southwest Asia huts, electrify a classroom, conduct numerous surveys of existing and future construction projects, and construct a combat road.

The other huge dividend that materially contributed to Task Force 844's postmobilization training was the presence of two subject matter experts from the 54th Engineer Battalion, the task force's relief-in-place/transfer-of-authority (RIP/TOA) partners, while conducting a mission readiness exercise. The benefits of their presence were immeasurable. The task force adopted this "pay-it-forward" methodology for every RIP/TOA in the future, sending company representatives on temporary duty back from theater for every incoming unit.

Lines of Effort

Once the task force hit the ground in Kuwait, leaders conducted all required theater training, taking full advantage of the mine-resistant, ambush-protected (MRAP) vehicle operator and maintainer courses, setting conditions for eventual movement into Baghdad. Once in Baghdad, Task Force 844 conducted a standard RIP/TOA with the 54th Engineer Battalion, but now the task force had an entirely different mission. It would serve as the theater construction battalion, operating along three lines of effort (LOEs):

- Security
- Partnership
- Civil Capacity

What made this mission different from its predecessors was that the task force worked directly for the 555th Engineer Brigade at the start of the deployment (and for the 194th Engineer Brigade after midtour), performing all of the above LOEs in general support to the corps and the multinational divisions. All other engineer battalions in the theater served in a direct support role in a finite operational environment. The challenge for Task Force 844 was to operate in 14 of 18 Iraqi provinces, often simultaneously, and to effectively command and control that effort.

Security

This included all general support construction required for the theater. On 30 June, shortly after RIP/TOA, U.S. forces were scheduled to exit from cities, villages, and locales, according to the Status-of-Forces Agreement signed in 2008. The direct impacts to the task force were that many of the joint security stations and contingency operating posts had to relocate to larger bases. Later in the deployment, infrastructure required to facilitate the responsible drawdown of forces became a separate LOE and entailed the creation of infrastructure to move the forces and equipment out of Iraq.

The second portion of this LOE was assured mobility in the form of bridging. The 401st and 250th Engineer Companies (Multirole Bridge) were responsible for both routine inspections and maintenance of all the military bridges in southern Iraq.

Partnership

This included partnering with two separate Iraqi Army engineer units—the 8th Field Engineer Regiment in Diwaniyah and the Headquarters Field Engineer Regiment at Taji. Military transition teams were established at both locations, conducting training in many disciplines, including construction project management, combat lifesaver, staff-to-staff interaction and mentoring, maintenance, and bridging. Lifelong friendships were forged in this process.

"Company commanders tailored their force packages based on skill sets, not as platoons.... This was the key to the success of the task force: small-unit leaders trusting noncommissioned officers (NCOs) and junior enlisted Soldiers to lead projects and thrive."

Civil Capacity

This included partnering with five provincial reconstruction teams in conjunction with the 172d Infantry Brigade—and later the 3d Brigade, 3d Infantry Division—conducting numerous site surveys and completing more than 30 projects in this endeavor. What made this an interesting mission was that the combat forces applied to this effort were all active duty Air Force, further displaying the task force's ability to work as a joint team. The task force was able to accomplish many missions, travel more than 954,000 miles, complete 226 projects, and earn a meritorious unit commendation because of its best business practices.

Best Business Practices

Task Force 844 leaders established certain principles as guideposts to gauge the success of their mission. These best business practices included—

Battle Rhythm

The staff must work for the commander and not vice versa. The battle rhythm for the seven subordinate units had to mesh so that commanders could have their Soldiers in locations as far away as Basrah and Camp Korean Village and still be able to interact. Web-based tracking and communication software ensured connectivity and responsiveness across the entire Iraq joint operating area.

Work Ethic

The maxim that "engineers are not kept in reserve" rang true for Task Force 844. The theater engineer brigade assigned numerous projects to the task force, but many projects were developed in conjunction with the operational environment owner and only later gained brigade approval. But this was not the only key to success. Company commanders tailored their force packages based on skill sets, not as platoons; thus, a platoon could be doing as many as five projects simultaneously. This was the key to the success of the task force: small-unit leaders trusting noncommissioned officers (NCOs) and junior enlisted Soldiers to lead projects and thrive.

Platoon Warrant Officers

A singular success of the construction effort was the role played by three platoon warrant officers, all utilities operation and maintenance technicians (MOS 210A). They served as mentors and leaders throughout the entire construction process. Each one had unique talents that had major impacts on the success of the task force while also developing the next generation of technical leaders.

Metrics

Everything that a unit does can be quantified, whether it is the number of miles driven, feet of conduit installed, or number of Army physical fitness tests passed. Each metric was a gauge of success and, properly documented, made development of counseling sessions, awards, and after action reviews a simple process. When metrics are determined and constantly compiled, end-of-deployment awards and evaluations take care of themselves.

Transportation Assets

One of the practices the task force inherited from its predecessors was taking the majority of M916A1/M870A1 tractor-trailer combinations out of the horizontal companies and moving them to the forward support company (FSC). Otherwise, once a piece of equipment and an operator were delivered by the tractor-trailer to a job site, the combination would sit unused until the end of the project. With the FSC controlling that asset based on task force movement needs, those vehicles stayed in motion and ensured that the lifeblood of logistics flowed for the task force across the entire Iraq joint operating area.

Horizontal Company Maintenance Technicians

Despite having an enormous amount of rolling stock, there is no maintenance warrant officer in the modified table of organization and equipment (MTOE) for the horizontal company. When a unit maintenance technician (MOS 915A) was detached from the FSC to the 961st Engineer Company (Horizontal), the warrant officer magic began. At the time of RIP/TOA, the unit was far below an acceptable operational readiness rate. Within a mere 60 days, through the expertise of this warrant officer, the unit attained a readiness rate higher than 90 percent. This should be seriously considered as a change and documented in the future.

Junior Leader Development

As an Army Reserve unit, the amount of time available in a nondeployed status is far less than required to develop junior leaders. Unit leaders took advantage of the time while deployed to conduct regular officer and NCO development classes. Since many junior NCOs serving in squad-level leadership positions were lacking the tools to properly do their jobs, the task force command sergeant major crafted a two-day NCO development workshop, using small-group instruction on counseling, evaluations, supervision, and leadership. In the process, the workshop developed more than 200 junior NCOs and made the task force stronger in the process.

Recognition

Acknowledgement of a job well done was a hallmark of our deployment experience. The leaders of Task Force 844 ensured that deserving Soldiers were recognized. During the deployment, the task force garnered the Itschner Award, the Sturgis Medal, the Van Autreve Award, and the Steel deFleury Medal. The task force also administered an active Bronze deFleury Medal program. Even more noteworthy is that one logistician received the United States Army Quartermaster Corps Order of St. Martin, and two maintainers received the United States Army Ordnance Corps Order of Samuel Sharpe. The task force additionally had an element that competed for the Army Award for Maintenance Excellence at the Department of the Army level.

Information Operations

The message is just as important as the mission. Task Force 844 executed an aggressive information operations campaign throughout the entire deployment process. Elements of the task force were on Armed Forces Network and the Pentagon Channel frequently and conducted a weekly radio talk show highlighting the Soldiers of Task Force 844 and their service on our Knoxville-based radio station, WIVK-FM. The public affairs officer, a sergeant, excelled at her job.

Summary

The author hopes that some of the information in this article gives pause to future command teams as they prepare to deploy as part of the best-trained, best-equipped, and best-led Army that our nation can provide.

Lieutenant Colonel Roth was the commander of the 844th Engineer Battalion at the time this article was submitted. He is now attending the Army War College at Carlisle Barracks, Pennsylvania. He has served in numerous staff assignments, including a tour as the executive officer of the 458th Engineer Battalion, and has commanded a combat heavy engineer company. He is a graduate of the Command and General Staff College and holds a master's in mechanical engineering from Boston University.

THE ENGINEER WRITER'S GUIDE

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

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JTF North Engineer Division

Building Leaders and Refining Skills Along the Southwest Border

By Major Christian L. Neels

For more than 20 years, the Joint Task Force (JTF) North Engineer Division has assisted volunteer engineer units with lighting and fence-building operations and construction of roads and bridges along the border between Mexico and the United States in Texas, New Mexico, Arizona, and California. The units, typically platoon-size elements, conduct 30- to 45-day missions in austere environments, similar to those found in the United States Army Central Command's area of responsibility, to increase the United States Border Patrol's ability to interdict transnational threats such as international terrorism, narcotics trafficking, illegal alien smuggling, and other activities that threaten homeland security.

The opportunities JTF North missions provide to develop leadership skills and military occupational specialty (MOS) proficiency are rarely available at home station due to training area restrictions, lack of resources, and a variety of training distractions. During a JTF North engineer support mission, a deployed unit will execute a real-world engineer operation in an environment where distractions are minimal, the terrain is often complex, standing rules on the use of force are strictly observed, and mission funds are readily available. (JTF North funds most mission-related requirements, and the supported agencies pay for all material costs.) Although training away from the flagpole can be difficult, the JTF North missions present units with challenges they may face during future deployments on overseas contingency operations.

JTF North Mission Phases

Missions are normally conducted in four phases: predeployment, deployment, employment, and redeployment. All phases provide outstanding opportunities to build small-unit leadership and hone Soldiers' MOS-related skills, to include—

- Construction planning and supervision.
- Logistics and resource coordination.
- Risk management and environmental plan development.
- Budget maintenance.
- Command and control.
- Reporting and briefing.
- Personal issue resolution.
- Troop-leading procedures.
- Operations security practices.
- Daily Border Patrol intelligence updates.
- Construction equipment operation and maintenance.
- Drafting and surveying.

To ensure that the unit has adequate preparation time to execute a JTF North mission, initial coordination with the unit usually begins a year before the proposed execution date. The JTF North staff assists the unit throughout the four phases to ensure mission success.

Predeployment

Following an initial planning conference outlining unit requirements and available support, unit leaders conduct an initial visit to the construction site. During this visit, a JTF North engineer mission planner (an engineer officer from one of the four branches of the military), the Border Patrol project managers, and United States Army Corps of Engineers (USACE) representatives walk the ground with the unit leaders, highlighting the scope of work with the plans that will be used for the mission. After the construction site reconnaissance, the group conducts an overview of the local area and available life support and answers questions before the unit leaders return to home station for continued planning. Throughout the planning process, unit leaders gain valuable experience in—

- Developing training plans to prepare Soldiers for the mission.
- Determining task organization and equipment requirements.
- Coordinating to obtain needed resources.
- Working within an established budget.

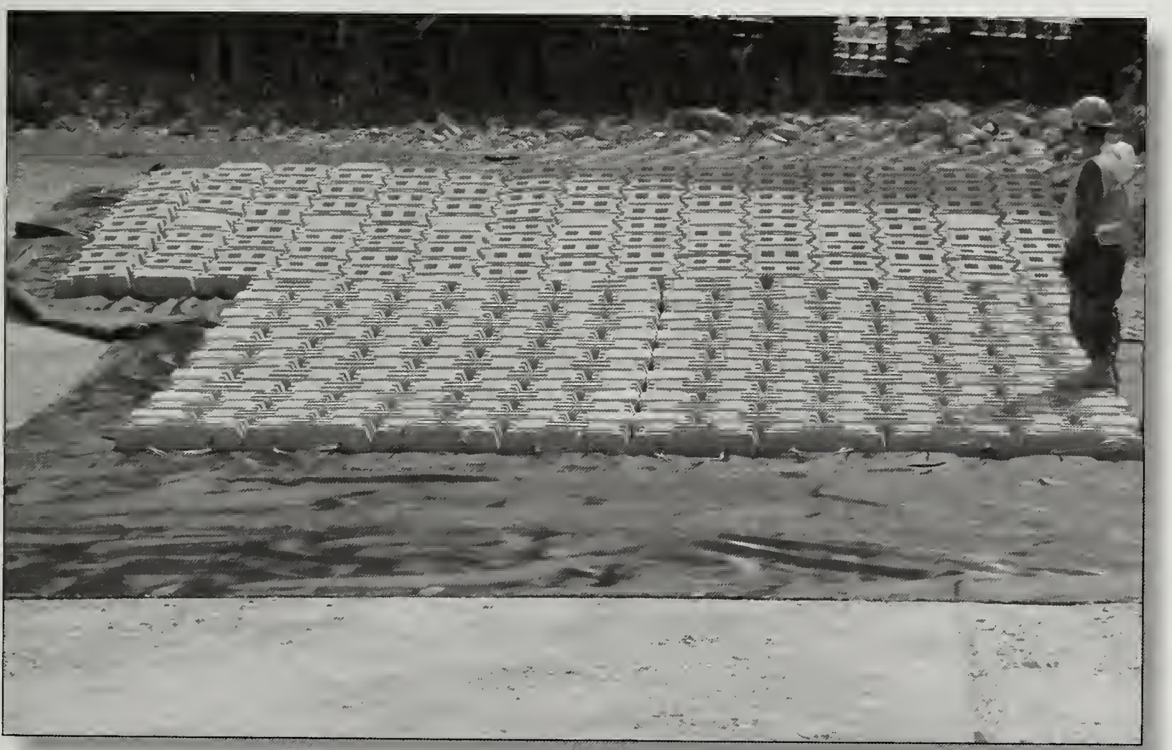
Leaders also gain proficiency in reading construction plans and work with JTF North, the Border Patrol, and USACE to agree on a tailored scope of work that the unit can achieve during its deployment. Throughout the planning and execution of the mission, the JTF North staff is available to provide assistance and recommendations. At the end of the predeployment phase, a mission confirmation briefing is conducted for JTF North leaders. In preparation for this briefing, orders and presentation skills are honed at home station and with the JTF North mission planner.

Deployment

During the deployment phase, the unit begins reporting to JTF North, and advance echelon personnel arrive to draw equipment and conduct final coordination for a bill of materials (BOM) and life support and prepare to receive the main body. Although JTF North mission and logistics planners are available to assist, unit leaders are expected to take the lead. The unit must inventory and sign for equipment, conduct a joint inspection of rented equipment with vendors, and finalize the delivery schedule of the project BOM. Additionally, final coordination with the Border Patrol and USACE is conducted. Maintaining accountability of unit personnel throughout the deployment process tests the unit's personnel management and tracking systems and reporting procedures.

Employment

Following mission startup briefings from the JTF North staff and the Border Patrol, the unit conducts site



A Seabee observes the Armorflex installed for a low-water crossing along the United States–Mexico border. Reserve Component units use the JTF North engineer support missions to accomplish their annual two-week training requirement. Reserve Component units can rotate their personnel throughout the mission.

Navy Seabees construct an improved road east of Nogales, Arizona. To accomplish its engineer support missions along the Southwest border, JTF North employs engineers from all the military services.

familiarization, rehearses medical evacuations, and begins construction on the project. In addition to the leadership required to execute the plan and enforce safety, discipline, and quality control, the unit works with multiple outside agencies. Leaders maintain constant contact with the Border Patrol for security and intelligence updates, with USACE or their designated representative for project inspections, and with civilian contractors delivering BOM and providing equipment maintenance.

Soldiers gain critical experience in their MOSs in complex terrain, which is often different from the terrain at home station. Soldiers on road construction projects have the opportunity to hone their skills operating water trucks, bucket loaders, bulldozers, excavators, graders, and a variety of other heavy equipment required for their specified scope of work. Personnel conducting lighting missions have wire pulls and excavators and may work beside civilian electricians when required. Although basic operator preventive maintenance is required on the rented equipment, mechanics from the rental company are often provided, reducing unit maintenance requirements.

In addition to construction equipment, JTF North works with the Border Patrol and USACE to use materials that are unavailable at home station but that the unit may need in future operations. Due to the complex terrain, low-water crossings often have to be emplaced. Rather than forming and pouring a concrete low-water crossing, JTF North and USACE prefer Armorflex® matting. These preformed, flexible 8-foot-by-20-foot concrete block mats can be used for roadways or erosion control, reducing the time of emplacement, and giving units experience emplacing the material. At the completion of the mission, units conduct a joint after action review with JTF North personnel, the supported Border Patrol station, and USACE. Lessons learned are captured for follow-on units and help tailor the unit's training on return to home station.

Redeployment

Following mission completion, the unit's main body redeploys while the rear party closes out contracts for equipment and billeting and returns equipment drawn from JTF North. Lessons learned throughout the deployment process can then be applied by the unit to improve redeployment operations. Within 30 days of mission completion, the unit is required to provide a written after action review outlining issues encountered and providing recommendations.

Conclusion

JTF North missions provide junior engineer leaders an ideal environment to increase their planning and leadership skills while increasing their Soldiers' MOS competencies. The opportunities to work with outside agencies and to practice the coordination needed to successfully complete JTF North missions are seldom found in the continental United States. The JTF North engineer support missions have proven invaluable to units preparing for future operations.

Units interested in volunteering to execute a homeland security engineer support mission can contact the JTF North Engineer Division at commercial (915) 313-7609 or DSN 666-7609.

Major Neels is an engineer mission planner for JTF North. Previous assignments include platoon leader and company executive officer with the 2d Engineer Battalion, 2d Infantry Division, Republic of Korea; task force engineer, battalion operations officer, and company commander with 3d Battalion, 7th Infantry Regiment, Fort Stewart, Georgia; and brigade engineer for the 4th Brigade Combat Team, 3d Infantry Division, Fort Stewart. He holds a bachelor's in English from Coe College, Cedar Rapids, Iowa, and is a graduate of the Engineer Officer Basic Course, Infantry Captains Career Course, and Pathfinder and Airborne Schools.

Note: The photos used in this article are of a JTF North engineer road support mission executed in Nogales, Arizona, in October and November 2009, by a detachment from Naval Mobile Construction Battalion Two Six, based at Mount Clemens, Michigan.

USACE Takes Going Green to New Heights

By Dr. JoAnne Castagna

It's been called the new centerpiece of the city of Alexandria, Virginia. It is the new multistory Department of Defense (DOD) administrative office complex. The facility is not only the tallest structure in the region but also the tallest building ever erected by the United States Army Corps of Engineers (USACE).

LEED Certification

What isn't as obvious as the size of the building is something that may be more impressive. This is the first project of this size where the Corps is working for Leadership in Energy and Environmental Design (LEED) Gold building certification and the only one in the region that will save 30 percent of the energy of a traditional complex—and save taxpayers millions.

LEED is an internationally recognized green building certification system that was developed by the United States Green Building Council. There are different levels of certification, based on the number of points earned; LEED Gold is one of the top certifications, earning 60–79 points. Other certifications are Certified (40–49 points); Silver—the minimum level to be achieved for federal buildings

Photo by Marc Barnes, U.S. Army Corps of Engineers

Precast exterior wall panels are quickly rising to the top of 17-story and 15-story office towers as construction continues on the Department of Defense office complex at the Mark Center in Alexandria, Virginia.

A contractor applies materials to seal the exterior wall of the south parking garage at the Department of Defense office complex (BRAC 133) project site.

Photo by Marc Barnes, U.S. Army Corps of Engineers

(50–59 points); and Platinum (80–100 points). The rating system is centered around prerequisites, credits, and points per credit—with credits based on possible environmental impacts and human benefits.

In March 2009, the USACE New York District began constructing the design-build complex located at the Mark Center in Alexandria, in partnership with Duke Realty Corporation and Clark Construction. The complex will be home to multiple DOD agencies that are currently occupying leased space throughout the National Capital Region and will also include the Washington Headquarters Services, the base realignment and closure (BRAC) executive agent for these DOD customers. The project—which when completed in September 2011 will become a part of Fort Belvoir, Virginia—implements the 2005 BRAC Commission Recommendation Number 133.

The new 1.7-million-square-foot facility sits on a 16-acre campus and, when construction is completed, will consist of two towers (15-story and 17-story), two parking garages, a visitor center, remote inspection facility, and a public transportation center that will service the Mark Center and surrounding community. The city of Alexandria and other team members stressed the importance of making this complex certified LEED Gold, and USACE made this its mission.

According to the chief of the BRAC 133 Project, the goal was to have two certifications for the complex—LEED Silver and LEED Gold. After a review of the original design plans showed that only one point separated the project from being certified LEED Gold overall, the chief decided to shoot for LEED Gold for the entire complex. To obtain that level, USACE is designing and constructing the complex using cutting-edge strategies to earn LEED credits.

Energy-Saving Features

The following features are estimated to save 30 percent on energy needed for the LEED complex:

Indoor Lighting

The team is taking measures to ensure that all of the DOD personnel will have adequate, yet energy-saving, lighting. The entire complex will have light-emitting diode (LED) and fluorescent lighting that will cost a little more to purchase up front, but will reap tremendous savings down the road. This type of lighting requires less electricity to run, and LED and fluorescent light bulbs last longer than typical bulbs—up to eight years! Lighting use will be conserved with the help of room occupancy sensors that will automatically turn lights on and off, depending on whether a room is being occupied.

Natural lighting will also be used to the fullest. The complex is being constructed with large, shatterproof windows that will allow an abundance of outside light into the building. To help distribute this light, work stations in the complex will be built with low cubicle partitions to make sure there is adequate light spreading throughout the building.

Indoor Air Quality

Low cubicle partitions will facilitate air circulation, thereby improving air quality, which is also a goal of the team. The complex will have an energy-efficient central air system that will keep indoor air comfortable year-round for the personnel. To conserve this air, large windows in the complex will be highly insulated to prevent air from leaking outside the building. Since fresh outside air is necessary for healthful indoor air quality, a system will be put in place for personnel to allow outdoor air into the building without wasting considerable energy.

The team is constructing "green roofs" on the Visitors' Center and Remote Inspection Facility in the complex. These rooftops with vegetation on them are not only esthetically pleasing but also hold in warm indoor air during winter and keep building interiors cool during the warmer months. Another way the team is keeping indoor air

Photo by Marc Barnes, U.S. Army Corps of Engineers

The USACE New York District is managing design and construction of the $1.08 billion facility as part of BRAC 2005.

comfortable on some structures is by installing special rooftops that will reflect sunlight away from the buildings, keeping indoor air cool during the warmer months.

Indoor air toxins are also a threat to air quality, and the team is taking measures to minimize this issue. One way is by using paints, carpets, and wooden furniture that emit lower levels of toxic fumes. After the structures are painted and carpeted and contain their furniture, the team will air out the structures before DOD personnel occupy the space. In addition, DOD has agreed to use low-toxin cleaning products inside the building after the occupants move in.

Water Efficiency

The complex will use nearly 50 percent less water than a traditional building of the same size—a savings of 4.5 million gallons of drinking water annually. To accomplish this, low-flow faucets, urinals, and showerheads will be used inside the complex. Outside the complex, there will be no landscape irrigation; only drought-tolerant native plants will be planted. The team is also constructing a bioswale—a ditch that catches rainwater and slows the water runoff from the site, capturing sediment and contaminants before they go into the storm drains—outside most of the main structures.

Recycling

When the project is completed, it is estimated that 6 million pounds—or 75 percent—of construction waste will be recycled and not placed in disposal sites. The team is also recycling some of the trees that they had to remove to construct the complex, taking the wood to create wall paneling for some of the complex's interior. Recycling will continue once residents are in the building; they will be provided a 500-square-foot recycling area in their loading dock with recycling bins that will also be stationed on each floor of the towers.

Transportation

The DOD agencies occupying the complex will encourage their employees to take alternate ways in commuting that will save energy and reduce pollution. The agencies are doing this by providing special parking for van pools, carpools, and fuel-efficient hybrid vehicles in the complex's two parking garages and by supplying 300 bicycle racks and showers for bicyclists. The complex will also have its own mass transit center with access to the Metro Bus, Dash Bus, and DOD shuttle services.

Summary

The BRAC 133 Project is an incredible mission for the New York District. As the standards for green building are slowly being worked out, they are going to get better, and USACE is helping to lead the way in moving them forward.

Dr. JoAnne Castagna is a technical writer-editor for the United States Army Corps of Engineers, New York District, and can be reached at <joanne.castagna@usace.army.mil>.

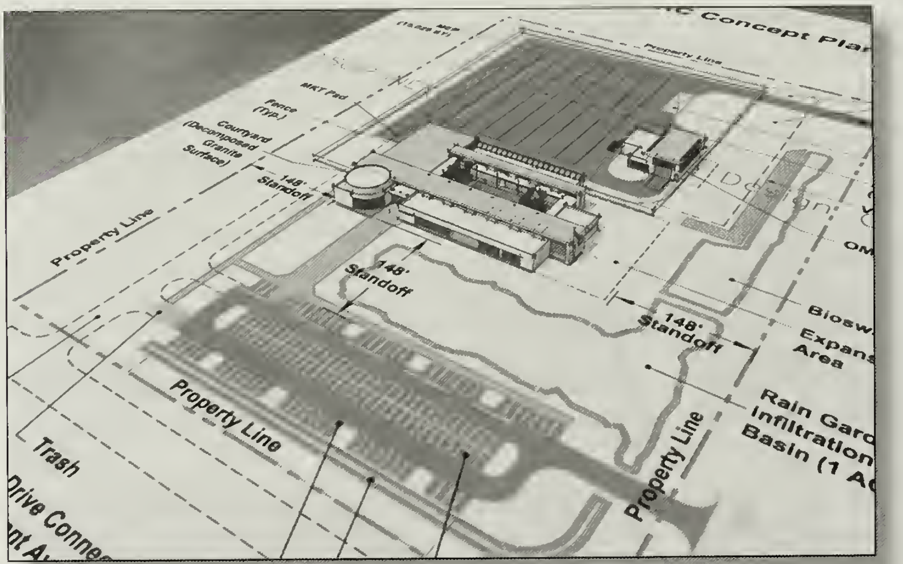
FROM COMPLIANCE TO SUSTAINABILITY:

ARMY RESERVE CONSTRUCTION PROJECT MOVING OFF THE ELECTRICAL GRID

By Lieutenant Colonel Bradley A. Duffey

Reducing fossil fuel consumption and conserving air, land, and water resources while trying to strengthen operational capacity and meeting current and future requirements may appear to be a daunting task, but the United States Army's Office of the Assistant Chief of Staff of Installation Management–Army Reserve Division is successfully doing both.

The project is the United States Army Reserve Center in Las Cruces, New Mexico, and the goal is to get the facility off the grid—or self-sustaining in all its energy needs—by 2012. The center will include a 32,000-square-foot training building, a 4,841-square-foot vehicle maintenance shop, a 1,065-square-foot unheated storage building, and a 15,760-square-foot organization parking lot. The project will be the Army's pilot program for Leadership in Energy and Environmental Design (LEED) Platinum. The extra costs of building to LEED Platinum standards will be paid for with energy savings.



Artist rendering of Las Cruces facility

LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. The Assistant Secretary of the Army for Installations and Environment laid out in a 2005 policy memorandum the Army strategy for integrating the principles and practices of sustainability on Army installations. That memorandum mandated that all military building construction, beginning in fiscal year 2008, would achieve at least the LEED Silver rating.

LEED was created to define "green building" by establishing a common standard of measurement, promoting integrated design practices, and transforming the building market. LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. The United States Green Building Council (USGBC) has outlined criteria that engineers can follow to gain LEED points. Using innovative wastewater technologies, redeveloping brownfields, building on sites easily accessible to public transportation, and reusing materials are just a few of the criteria. Under the system in place at the time, LEED Silver rating, the minimum for military construction projects, required between 33–38 points. LEED Gold took between 39–51 points, and LEED Platinum was between 52–69 points. A building with a LEED Silver rating consumes 30 percent less energy than a standard design. Depending on the steps taken to achieve the LEED Silver rating, the extra construction costs can be an added 5 to 30 percent.

There is more to this project than the typical solar panel placement, solar-lighted parking lot, trees for shade, or waterless urinals. A unique feature of the project is the use of rammed earth materials such as clay and sand compressed into formwork. Rammed earth construction uses noncombustible materials that are thermally massive and extremely durable. The thermally massive rammed earth walls in the Las Cruces project will absorb heat during the day and slowly leach the heat throughout the buildings, significantly reducing interior temperature swings. The thermal mass concept is also referred to as "passive design." Passive systems are simple, have few moving parts, need minimal maintenance, and require no mechanical systems. The project also uses *bioswales*, which are landscape elements designed to remove silt and pollution from surface runoff water. These bioswales, an alternative to storm sewers, are enhanced with an abundance of deep-rooted native plants. The cost in using bioswales is less than underground piping, and additional cost savings come from not having to use turf, which requires more water and maintenance. Incorporating bioswales as part of this project increased the USGBC points to achieve Platinum status.

Artist rendering of central courtyard

Artist rendering of southeast view of facility

The design of the training building has a courtyard in the middle of the structure. The courtyard is not just a trendy feature, but creates a stack effect as air naturally moves throughout the courtyard. The dimensions of the courtyard, coupled with the inside and outside air temperatures, create the airflow rate. The type of window in the building gives occupants additional control over the airflow into their offices. This courtyard design, using natural airflows, creates an airflow rate similar to a household fan and uses no electricity, as opposed to a typical household fan that uses an average of 200 watts of electricity.

The Office of the Assistant Chief Of Staff of Installation Management has quickly accelerated the goal of getting off the grid by 2030 with this Las Cruces project. More important, the Army Reserve is using this technology and innovation to anticipate future challenges to reduce consumption of natural resources while at the same time meeting current and future mission requirements.

Lieutenant Colonel Duffey, a student at the National War College, Fort McNair, Washington, D.C., was a project officer for the Office of the Chief of Staff for Installation Management when this article was submitted. His past assignments include police mentor team chief, Bala Baluk, Afghanistan; operations officer, Afghan Regional Security Integration Command–West; and reserve liaison construction officer for the Joint Multinational Training Command, Grafenwoehr, Germany. He holds a bachelor's from the University of Central Oklahoma in Edmond, Oklahoma, and a master's from Central Michigan University in Mount Pleasant, Michigan.

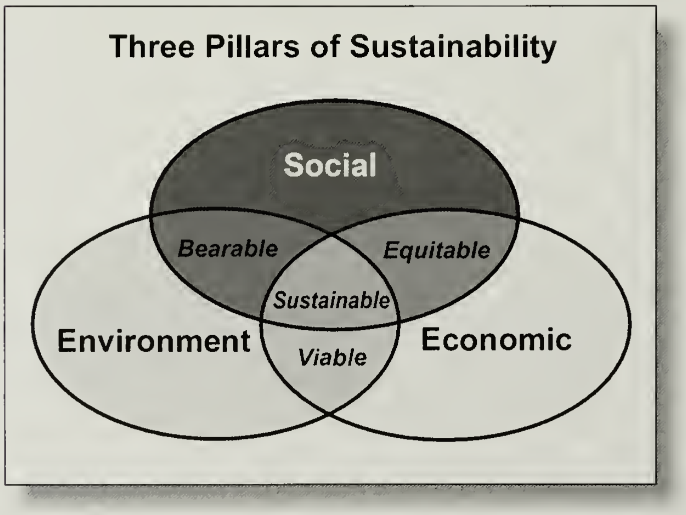
ENFORCE 2010

Photos by Visual Inromation Center

Army Sustainability and Leadership in Energy and Environmental Design

By Mrs. Rebecca C. Wingfield

Sustainability is one of the newest Army buzzwords. You may ask then, “What is sustainability?” The word *sustain* is of Latin origin, and sustainability is the capacity to uphold, maintain, or endure.[1] However, in the last several years the term has taken on a life of its own, and its meaning has changed from simple to highly complex. In the figure below, concentric circles represent the “Three Pillars of Sustainability” and their interconnections.[2] If you were to ask most people what sustainability is about, you might get answers concerning the state of the stock market, the housing market, agriculture, marriage and the family, or the earth’s ecosystems and how human activities are destroying our planet—all of which describe the capacity of certain aspects of our culture or society to endure. Although none of these answers are wrong, they don’t quite get to the Army perspective.


Three Pillars of Sustainability

Sustainable Practices

Army Sustainability, as defined in the 2010 Army Posture Statement, is—

“. . . a program to accelerate transition from the Army’s traditional, compliance-based approach in environmental stewardship to a mission-oriented, systems-based approach. Army Sustainability objectives are to meet current and future mission requirements worldwide, safeguard human health, improve quality of life, and enhance the natural environment. Sustainable practices improve our ability to organize, equip, train, and deploy our Soldiers as part of the joint force today and into the future. In the context of the new Army Sustainability Campaign Plan, sustainability involves—

- *Developing, producing, fielding, and sustaining materiel that is more energy efficient, capable of using renewable energy resources, reduces the use of hazardous materials, and generates less waste.*
- *Ensuring that the Army has sufficient access to training and testing resources, by incorporating sustainability into operational planning and execution so that the Army can continue to effectively train today and in perpetuity.*
- *Instilling sustainable practices in all levels of our Soldier and civilian education programs.*
- *Providing services and operating facilities in a manner that reduces consumption of resources, promotes the use of renewable energy sources, enhances quality of life, and continues to protect the environment.”*[3]

Apartment-style living with parking, dumpster, and gazebo

Sustainable Design and Development

This article focuses primarily on the fourth bullet of the Army Posture Statement on Army Sustainability. In 2001, the U.S. government determined that any new government facility would be environmentally friendly and sustainable. The Sustainable Project Rating Tool (SPiRiT) was created and used to design and rate projects for sustainable design and development (SDD) by the United States Army Corps of Engineers (USACE). The Office of the Assistant Secretary of the Army (Installations and Housing) announced in January 2006 that the Army would transition from its SPiRiT rating system to Leadership in Energy and Environmental Design (LEED) for all new construction projects, regardless of funding source:

> *"LEED buildings demonstrate better life cycle economic performance than conventional construction, use less energy and water, and have a smaller environmental footprint. According to the U.S. Green Building Council (USGBC), the Federal Government, the nation's largest building owner, has been among the top users of the U.S. Green Building Council's LEED rating system, and has also helped to develop and improve the rating system through participation in USGBC member committees."*[4]

The United States Army, as a proponent for LEED in this country, is a member of the USGBC, which promotes use of the LEED rating system and "green" building practices through its LEED certification program. LEED has become the industry standard for SDD and is used to certify buildings and structures as environmentally friendly systems.

The Energy Policy Act of 2005 and, most recently, the Energy Independence Security Act of 2007 (EISA 2007) require that SDD practices be used not only to introduce energy efficiency into systems and structures but also to require energy-use reductions.[5] Since 2007, all U.S. government structures built in the continental United States require third-party certification of performance energy standards for new government buildings—a requirement of the EISA 2007. In its Section 433, performance energy efficiency standards specified by the Department of Energy state that *"the buildings shall be designed so that the fossil fuel-generated energy consumption of the buildings is reduced, as compared with such energy consumption by a similar building in fiscal year 2003 (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency), by the percentage specified in the following table:*

Percentage Reduction	By Year
55	2010
65	2015
80	2020
90	2025
100	2030

Section 433 also requires that sustainable design principles be applied to the siting, design, and construction of buildings subject to the standards."[6]

According to EISA 2007, Section 433, a *"certification system and level for green buildings shall be identified by DOE [Department of Energy] in consultation with the Department of Defense (DOD) and GSA [Government Services Administration] based on Director of Federal High-Performance Green Buildings ([part of] GSA) findings."*[7]

USGBC is the third-party certification agent, and LEED is the certification rating system used.

LEED Rating System

LEED provides a complete framework for assessing building performance and meeting sustainability goals. The minimum certification level to be achieved for federal buildings is LEED Silver—the second of four ratings: Certified (40–49 points), Silver (50–59 points), Gold (60–79 points), and Platinum (80–100 points). Projects must achieve all the prerequisites and a minimum of 50 percent of the available points to be awarded LEED Silver certification. The allocation of points between credits is based on the potential environmental impacts and human benefits of each credit. The impacts and benefits are defined as the environmental or human effect of the design; construction; and operation and maintenance of the building (which include greenhouse gas emissions, fossil fuel use, toxins and carcinogens, air and water pollutants, and indoor environmental conditions). To earn LEED certification, the applicant project must meet requirements for all the prerequisites and credits worth the minimum number of points to earn the desired project rating. The LEED rating system is based on well-founded scientific standards, emphasizing state-of-the-art strategies for the following credit categories—which show the number of prerequisites, the number of credits, and the number of points possible to be earned per credit. Project points to be compiled are 100 base points and 10 bonus points, for a grand total of 110 points in these categories:

Sustainable Sites prerequisites (2) and credits (10) section focuses on environmental concerns related to the project landscape, the project hardscape (paved areas), and the exterior of the building—specifically, protection of open habitat; snow and ice removal; paints and sealants used on the building exterior surfaces; alternate methods of transportation (to reduce the need for automobile parking); and green roofs. (26 points possible)

Water Efficiency prerequisites (1) and credits (4) section focuses on environmental concerns related to the use and disposal of water in the project—for example, water-efficient landscaping; reduced-flow plumbing fixtures; and cooling tower water management. (6–10 points possible)

Energy and Atmosphere prerequisites (3) and credits (6) section focuses on building energy performance, as shown by modeling; managing refrigerants to eliminate CFCs; and using renewable energy. (11–35 points possible)

Materials and Resources prerequisites (1) and credits (6) section focuses on environmental impact of materials brought into the project (materials selection) and the minimization of landfill and incinerator disposal for materials that leave the project (waste reduction and disposal). (8–14 points possible)

Indoor Environmental Quality prerequisites (3) and credits (10) section focuses on occupants' health, safety, and comfort; energy consumption; air change effectiveness; and air contaminant management. (15 points possible)

Innovation in Design credits section focuses on use of new technologies and up-to-date research to introduce cutting-edge techniques into the green building industry. (6 points possible)

Regional Priorities credits section focuses on solutions unique to the region's environmental concerns. (4 points possible)[8]

Kitchen, showing tile floors, solid countertops, stackable high-efficiency washer and dryer, microwave oven, refrigerator, and dining counter for Soldiers

Recharging outlets for electric cars, preferred parking place, and stairs to entrance of 2d floor quarters

All members of DOD should support LEED certification use and advocate for it at their installations and facilities. LEED, by its very nature, supports Army sustainability goals, as shown in Executive Order (EO) 13514, issued in October 2009:

*"**Section 1.** Policy. In order to create a clean energy economy that will increase our Nation's prosperity, promote energy security, protect the interests of taxpayers, and **safeguard the health of our environment**, the Federal Government must lead by example. It is therefore the policy of the United States that **Federal agencies shall increase energy efficiency;** measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; **conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution; leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services; design, construct, maintain, and operate high performance sustainable buildings in sustainable locations; strengthen the vitality and livability of the communities in which Federal facilities are located; and inform Federal employees about and involve them in the achievement of these goals.**"*[9] (Emphasis added.)

This EO has set as policy **sustainability** in our building infrastructure. All of the above emphasized statements were implemented in *LEED 2009 for New Construction and Major Renovations*, the reference guidebook for the updated LEED rating system. Constructing more sustainable Army infrastructure allows for availability of more resources in support of the mission, Soldiers, and their families.

Another beneficial attribute of LEED buildings is that, in many cases, they are more comfortable to work and live in. LEED buildings often feature natural lighting, increased ventilation, and low volatile organic compounds (VOCs) in construction materials—all contributing to more comfort for inhabitants and producing less illness due to indoor air pollution. VOCs are the toxic compounds often found in many paints, glues, and solvents commonly used in building construction products and some industrial cleaners. In general, when people work in a sustainable building, greater productivity is the result, which leads to cost savings.

Sustainable Army Infrastructure

An excellent example of a LEED project at Fort Leonard Wood, Missouri, is the Permanent Party Barracks project, constructed by S. M. Wilson for USACE and completed in April 2010. The project was phase 3 of a 5-phase plan for permanent-party, single-Soldiers' barracks. This phase 3 project is expected to receive LEED Gold certification and was turned over to the Army ahead of schedule to allow redeploying Soldiers to move directly into these new quarters.

The buildings feature five apartment-style units per building. Each barracks unit has space for two Soldiers, except for the senior noncommissioned officer's (NCO's) quarters that are set up for the individual NCO. The second bedroom area in the NCO's quarters is furnished as a living room. The remaining four barracks units have two private bedrooms, each with a closet and a vanity. The Soldiers share a bathroom, the kitchen, and laundry. Kitchens include solid countertops; microwave ovens; full-size Energy Star-rated refrigerators; and a stacked, high-efficiency washer and dryer. There is one parking place per bedroom, which allows Soldiers to keep their vehicles clean, secure, and close to their quarters. This project also implemented preferred parking for two energy-efficient vehicles, with a power outlet for electric charges. The project features multiple basketball courts, volleyball courts, horseshoe pits, and a walking trail for physical fitness.

Excellent facilities like these can help increase retention rates and provide a higher quality of life for Soldiers, while increasing sustainability of our forces—which is one of the goals of the Army Posture Statement. Higher retention rates mean that fewer resources will have to be expended to keep the Army at a high rate of readiness in trained personnel. Showing Soldiers that they are valued members of the Army—a resource that the Army cannot do without—by providing them with high-quality, comfortable living quarters should mean that the Army will not have to work as hard to retain its forces.

Reducing the Footprint

Other sustainable strategies that DOD and the Army have implemented are policies such as buying green products for cleaning and promoting telework or telecommuting for those people whose jobs qualify

Horseshoe pits, volleyball courts, and basketball courts

for the plan. The telework strategy provides for approximately 20 percent of the workforce to use alternative work sites (for example, the home) at any one point in time.[10] This is an innovative way to diminish the infrastructure footprint of DOD, which can reduce—

- Energy costs in buildings, if they can be smaller.
- Number of employees commuting.
- Automobile emissions.
- Air pollution.
- Automobile accidents during inclement weather.

Not all agencies have employees who can telework, but agencies that do can provide a significant cost savings.[11]

The four goals of Army sustainability cover the functions of the Army and require members of the Army team to provide and improve innovative ways to increase the sustainability of the Army. If we stay open-minded to innovation, we can solve many of our sustainability goals.

Mrs. Wingfield is a civil engineer working for the United States Army Engineer School at Fort Leonard Wood, Missouri, in the Directorate of Environmental Integration. She previously spent 13 months working for the United States Army Corps of Engineers as a project engineer stationed in Basra, Iraq, and at Contingency Operations Base Adder near Nasiriyah, Iraq. She has also worked at Fort McClellan, Alabama; for the Department of Defense schools in the Federal Republic of Germany; and for the state of Illinois. She holds a bachelor's in civil engineering from the University of Missouri–Rolla (now Missouri University of Science and Technology). In January 2009, she was awarded LEED–AP BD+C accreditation (Leadership in Energy and Environmental Design–Accredited Professional in Building Design and Construction) by the United States Green Building Council, of which the United States Army is one of the leading members.

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Photo by Captain Sonie L. Munson

18th Engineer Brigade Maneuver Support Conference: Engineers Share Route Clearance Lessons Learned

By Captain Sonie L. Munson

Soldiers from across United States Army, Europe (USAREUR), and individuals from the Engineer Regiment came together for a maneuver support conference sponsored by the 18th Engineer Brigade at Heidelberg, Germany, in March. During the three-day conference, units throughout USAREUR shared lessons learned about route clearance operations during their recent deployments to Iraq and Afghanistan. The brigade commander, who began the conference with hopes that the information shared would go back to the units, said that knowledge is only useful when it is put to use.

Representatives from the 4th, 9th, and 54th Engineer Battalions spoke about the lessons they learned during recent deployments and held two panel discussions in which members of the Engineer Regiment asked questions to help them understand route clearance and how to operate at the battalion, company, and platoon levels.

The operations officer for the 9th Engineer Battalion, whose unit operated in five provinces south of Baghdad, Iraq, emphasized the importance of the top five lessons learned.

Centralized route clearance. This was essential to success because it allowed the battalion to plan all route clearance operations within the five provinces, letting the unit prioritize routes based on the threat in the area. The unit cleared an average of 4,000 kilometers a month, but when the threat from improvised explosive devices (IEDs) increased, the number of kilometers cleared doubled to ensure that the roads were safe for the local populace.

Effects-based operations. The 9th Engineer Battalion planned operations with certain outcomes in mind and achieved them in ways that weren't always obvious. For example, one desired outcome was to discover and eliminate IEDs. U.S. forces subjected IED sites to crime scene investigation, and sometimes that resulted in finding an IED emplacement or network. This practice convinced the Iraqi Army and Iraqi Police to establish their own crime scene investigation labs.

Robust engineer equipment fleet. This allowed U.S. engineers to complete any engineering mission assigned, whether route clearance or general engineering. A large fleet rendered the unit less vulnerable to shortages or delays in orders for low-density items or those that weren't in the military ordering system.

Training as multifunctional engineers. Training in military occupational specialties other than their own resulted in better-trained Soldiers and helped break up the monotony of long duty hours. The change of pace gave general engineering Soldiers time away from construction sites and helped keep Soldiers alert during their route clearance missions.

Crew rest management. Many Soldiers needed to perform maintenance during rest periods and needed more time to wind down before they were able to fall asleep. This resulted in overall lack of sleep and mission ineffectiveness. To counter this problem, leaders ensured that Soldiers were getting enough sleep by checking rooms during lights-out, thus managing crew rest periods.

Route clearance is one of the Engineer Regiment's most important missions in the wars in Iraq and Afghanistan. By keeping open lines of communication and sharing lessons learned, USAREUR leaders hope to improve engineer performance and save Soldiers' lives.

Captain Munson was the public affairs officer for the 18th Engineer Brigade when this article was written. She took command of Headquarters and Headquarters Company, 15th Engineer Battalion, Schweinfurt, Germany, in July.

Army Delivers Route Clearance Vehicle Capabilities

By Lieutenant Colonel Charles P. Dease

While clearing routes in the war zone, Soldiers keep their eyes and ears open for any visible threats. The environment is difficult and inhospitable. The driver accelerates the vehicle, then. . . an explosion! A powerful blast wave ripples through the vehicle, creating deafening noise and smoke. Any contents of the vehicle not secured become airborne; the occupants are stunned and disoriented. Finally, stillness and awareness return. Moments later, Soldiers rise from the remnants of their vehicle. Each passenger is accounted for and checked for injuries. More often than not, the injuries are not severe, and the trailing convoy can move forward. It is another victory against the enemy.

The scene described above is not always the result when a route clearance vehicle (RCV) encounters an improvised explosive device (IED). However, such fortuitous outcomes are becoming more common, due to the evolution of RCVs that can detect, identify, neutralize, or defeat explosive hazards, enabling warfighting commanders to operate with minimal interruption. The Army's Product Manager, Assured Mobility Systems (PM AMS) leads the development, procurement, fielding, sustainment, and upgrade of the Army's young fleet of RCVs.

Development and Fielding

In 2005, the Program Executive Office for Combat Support and Combat Service Support (PEO CS&CSS), which is located at the U.S. Army TACOM Life Cycle Management Command (TACOM LCMC) in Warren, Michigan, created PM AMS with a charter to manage the product life cycle of the swiftly emerging route clearance fleet of vehicles. PM AMS reports to the Army's Project Manager (PM), Mine-Resistant Ambush-Protected (MRAP) Vehicles, falling under the leadership of the PEO CS&CSS.

PM AMS approached its mission with a sense of urgency—route clearance capabilities were needed in-theater to save Warfighters' lives. Today, the development and fielding of route clearance capabilities continue to remain important. According to the Defense Manpower Data Center, IEDs are responsible for nearly two-thirds of all casualties caused by hostile action in Afghanistan and Iraq.

The objective of PM AMS is to provide effective, reliable, and affordable vehicle platforms capable of detecting, identifying, neutralizing, and defeating suspected explosive hazards. Most MRAP vehicles are general transportation assets designed to protect their occupants while trying to avoid hazards. PM AMS works on the engineering development, procurement, fielding, and sustainment of RCVs specifically designed to seek out explosive hazards. Some may look at a destroyed vehicle and think the enemy is winning. However, when an RCV encounters an IED and Soldiers walk away, that vehicle—regardless of its state—has accomplished its mission. The former deputy PM AMS corroborates Soldiers' confidence in what the Army is fielding and their expressed pride in clearing a route for others, then walking away from the destroyed vehicle.

Growing Route Clearance Capabilities

In its infancy, PM AMS supported only a few vehicles that were procured to fill operational needs statements (ONS). As war requirements increased, PM AMS grew as well, currently managing 17 configurations of 5 different vehicle systems totaling approximately 1,500 RCVs.

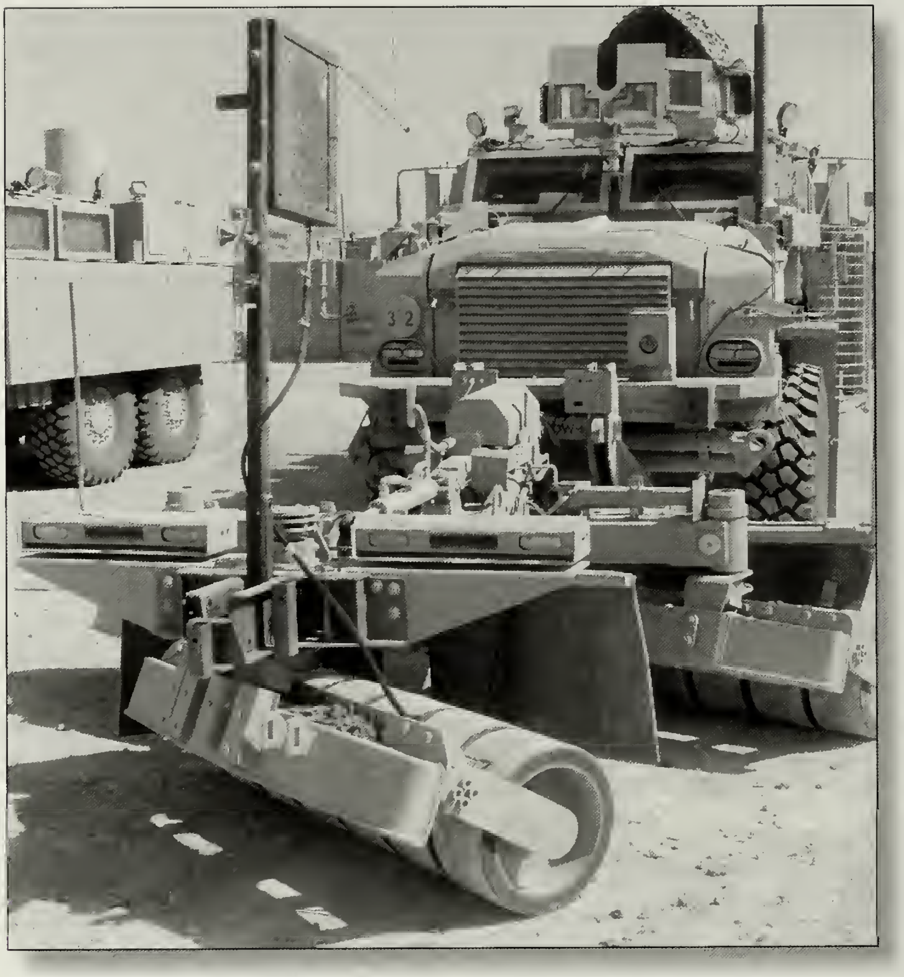
The current fleet includes the Husky Vehicle-Mounted Mine-Detection (VMMD) System, the Buffalo® Mine-Protected Clearance Vehicle (MPCV), the Panther Medium Mine-Protected Vehicle (MMPV), the Joint Explosive Ordnance Disposal (EOD) Rapid Response Vehicle, and the RG-31 Mine-Protected Vehicle (Route Clearance Variant). A core PM AMS team—composed of a systems acquisition manager, a systems engineer, and a logistician—is responsible for managing each vehicle system's life cycle.

Additionally, PM AMS employs multiple support teams to perform critical functions to ensure the organization's success. Charged with developing solutions to Army G-3 validated requirements and capability requests from theater, the PM AMS engineer integrated product team (IPT) has developed and/or integrated many crew survivability upgrades, including improved seats and seat belts; fire suppression systems; gunner platforms; gunner restraint systems; Objective Gunner Protection Kits (OGPKs); mine/IED rollers; rocket-propelled grenade and explosively formed penetrator protection kits; transparent armor (glass); and remote weapon stations. The IPT also integrated command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) upgrades—such as situational awareness cameras, light kits, driver's vision enhancement, and Blue Force Tracker systems. These enhancements have increased capabilities and effectiveness of the RCVs.

The business management team ensures that appropriate funding is available and conducts financial and other analyses to guarantee proper utilization of resources. The

Photo by Sergeant Teddy Wade

U.S. Army Soldiers wrap a towing rope around the front end of an RG-31 MRAP vehicle during a mission in Afghanistan.



This U.S. Army Panther MMPV is equipped with a mine/IED roller to help neutralize or defeat explosive hazards.

fielding and sustainment team focuses on getting vehicles into theater and sustaining them once there. The RCV fleet and its subsystems are new pieces of equipment fielded to theater to support ONS requirements. The Army's logistics and sustainment infrastructure does not yet support the new equipment; therefore, to sustain the RCV fleet in-theater, PM AMS covers the support gap with a refined contractor logistics support (CLS) concept. According to the PM AMS logistics lead, the CLS concept provides logistics, training, maintenance, and repair operations at a number of battlefield repair locations in Iraq and Afghanistan. New equipment training teams conduct vehicle handoff to units and train Soldiers to operate and maintain RCVs and their subsystems.

A small quality assurance team ensures that PM AMS-developed vehicles are appropriate for Soldier use and meet all quality vehicle standards. Additionally, there are three other acquisition managers in charge of modernization, drawdown efforts in Iraq, and harvesting. The harvesting program will take a select number of RCVs and RG-33+ MRAP vehicles procured as ONS vehicles, upgrade them to RCV specifications, and return them to the RCV fleet. The Deputy Product Manager, PM AMS, described this very dedicated group that is constantly working to improve their responsiveness to the Warfighter. Due to urgency and the constantly evolving threats, PM AMS realizes that developing an 80 percent solution immediately is better than developing a 100 percent solution three months from now.

POR Vehicle Development

PM AMS already has begun to procure and test the three program of record (POR) RCVs—the Husky, the Buffalo, and the Panther. POR-configured Huskys, Buffalos, and Panthers have already been fielded in-theater—albeit under urgent materiel release criteria—in support of current operations.

The Husky is extremely accurate in identifying a buried threat. It drives in front of convoys to detect suspected explosive hazards, marking them for identification. The Buffalo is a specialized mine-clearing/anti-IED vehicle equipped with a distinctive hydraulic arm that interrogates suspected explosive hazards and clears them when necessary. The Panther is a command and control vehicle designed to neutralize or defeat explosive hazards and is equipped with PackBot or TALON® robots. The robots provide route clearance or EOD units with standoff protection, since Soldiers can deploy and operate the robots from the Panther's armored workstation.

PM AMS personnel are simultaneously completing other full materiel release requirements in preparation for fielding the POR RCV fleet of vehicles to units. The goal is to begin fielding POR RCVs in 2011.

Providing Confidence

Soldiers are highly confident of this lifesaving equipment. The PM AMS team, RCVs, and their integrated subsystems help defeat explosive hazards, clear routes, and save Warfighters' lives. With the confidence RCVs provide, Soldiers on route clearance patrol become the hunters. Everyone following in convoys has safe passage, because the RCVs are neutralizing the threats.

Lieutenant Colonel Dease is the former product manager for PM AMS. He holds a bachelor's in business administration from Claflin College and a master's in acquisition and contract management from the Florida Institute of Technology. He is a graduate of the Command and General Staff College and the Program Manager Course. A member of the Army Acquisition Corps, he has earned level III certification in program management from the Defense Acquisition University.

Employing the Route Clearance Package in Afghanistan

By Major Gerald S. Law

Numerous articles have been written describing route clearance package (RCP) formations, equipment, and targeting; however, minimal references exist for employing the RCP. Therefore, this article presents lessons learned in Afghanistan for RCP employment. The intent is to change the way we think about tasking, managing, and employing the RCP. The article will not describe RCP tactics, techniques, and procedures used in Afghanistan.

What Is the Problem?

In May 2009, the 4th Infantry Brigade Combat Team (IBCT), 4th Infantry Division, deployed to the Nangarhar, Nuristan, Kunar, and Laghman (N2KL) provinces of Afghanistan to support Operation Enduring Freedom. N2KL, located in eastern Afghanistan, covers more than 25,000 square kilometers but contains only a small number of vehicle-accessible routes. Therefore, the Anti-Afghanistan Forces (AAF), which include all elements fighting U.S. and coalition forces in Afghanistan, easily predicted where U.S. and coalition forces traveled and frequently inflicted casualties using improvised explosive devices (IED) and complex attacks.

To combat this threat, Combined Joint Task Force (CJTF)–82 allocated three RCPs to support the brigade. One RCP consisted of infantry and engineer Soldiers from the brigade's organic special troops battalion and one of its infantry battalions. The other two RCPs arrived from the engineer brigade supporting CJTF-82 in-theater; however, these two RCPs were task-organized as general support to the IBCT.

Who Controls the RCPs?

Who controls the RCPs, decides their missions, and approves the routes they clear? These questions raised concerns among staff members and commanders from CJTF–82, the IBCT, and the engineer

Photo by First Lieutenant Alex B. Armstrong

A Buffalo interrogates a suspected IED site along a key route in Afghanistan.

Photo by First Lieutenant Alex B. Armstrong

An RCP conducts operations in difficult terrain in Afghanistan.

brigade. Doctrine was referenced, slides were briefed, and arguments heard; in the end, it came down to common sense. The brigade combat team (BCT) controls the RCPs, decides their missions, and approves or disapproves the routes they clear. The BCT maintains responsibility for mission accomplishment, owns the assets, resources additional enablers, and synchronizes those assets and enablers in support of the brigade, battalion, or company.

For example, a battalion task force within the BCT is tasked to conduct a key leader engagement to assess the security situation within a village. The battalion develops a plan and tasks a company to accomplish that mission. Additionally, the battalion requests resources to facilitate mission accomplishment. The route to the village is expected to harbor IEDs, so the battalion ensures freedom of maneuver by requesting an RCP from the brigade. Furthermore, the battalion requests additional assets such as rotary-wing aircraft and intelligence, surveillance, and reconnaissance (ISR) assets to support the company and the RCP. The mission has a high probability of success, because the battalion task force, which is familiar with the area, decides it would be best to attack the device for this mission. The battalion provides a maneuver company to conduct the mission, requests the RCP to maintain freedom of maneuver, and allocates rotary-wing and ISR assets to support the company and the RCP.

Defeat the Network or the Device?

In the counter-IED fight, the BCT must decide to defeat either the network or the device. The primary and most desirable method for defeating the IED is to defeat the network. This involves data gathering and analysis, intelligence development, and action. Simply, the BCT plans and executes missions to remove an IED cell by eliminating its leadership, personnel, and resources. Additionally, this article argues that it's the BCT which mainly conducts the "decide, detect, deliver, and assess" process—not the RCP's parent unit.

Furthermore, if the BCT's command group or staff believes that the IED network still exists along a route and that mission requirements dictate movement or maneuver along that route, then the BCT resources and synchronizes the RCP to defeat the device. True, RCPs gather data and develop intelligence from acquired IEDs and IED parts found, which enable the BCT to defeat the network; however, the RCP's primary purpose at this point is to defeat the device.

What Routes to Clear?

RCPs clear routes in direct support of a BCT maneuver element conducting a mission. RCPs conducting missions that are not in support of a BCT maneuver element are not defeating the device, but simply putting RCP assets at risk. This argument is based on three assumptions:

- AAF IEDs can damage or destroy RCP assets.
- AAF have more IED-making material and resources than U.S. and coalition forces have RCP assets within a BCT's area of operations.
- AAF can predict the routes U.S. and coalition forces use within a BCT's area of operations, thus giving the AAF the initiative.

Once an RCP clears a route, the AAF simply return and reseed it with new IEDs. Even if an IED is found, the RCP used its resources to clear AAF resources, which puts the RCP at risk and results in a net gain of zero. Therefore, RCPs must support a BCT maneuver element tasked to conduct a mission. Only then are they defeating the device. Examples of BCT maneuver missions RCPs may support include—

- Conduct a key leader engagement or border flag meeting.
- Deliver humanitarian assistance.
- Kill or capture a high-value target.
- Escort a combat logistics patrol.
- Conduct area or route reconnaissance.

Furthermore, an RCP defeats a device if it provides freedom of maneuver (freedom of movement) to the BCT element even if the RCP loses a vehicle in the process. For example, an RCP may lose a vehicle, but if the BCT maneuver element maintains freedom of movement along the route and succeeds in conducting the border flag meeting or delivering humanitarian assistance to a village, then the mission has been accomplished. However, an RCP that encounters an IED and loses a vehicle without providing freedom of movement to an element has allowed the AAF to defeat the RCP.

Remember that RCPs must support a maneuver element tasked to conduct a mission. The RCPs should not be sent out on "clear-a-route-we-haven't-cleared-lately" types of missions. The AAF want U.S. and coalition commanders to commit RCP assets to clear routes not immediately vital to mission accomplishment.

Lessons Learned

- RCPs should support battalion missions. (Supported battalions work to have additional assets for operations.)
- RCPs are not stand-alone elements but support provincial reconstruction teams, agricultural development teams, companies, or platoons conducting missions in support of brigade, battalion, or company operations.
- The job of the RCPs is to clear routes that have, or are suspected of having, IEDs on them. It is not their job to clear routes that don't have IEDs.
- RCPs are put at risk when units send them to clear routes with no additional support. When units send RCPs to clear routes not required by a maneuver element, the RCPs are exposed to risk uselessly.
- RCP missions should be briefed 96 hours out to the brigade commander every day for approval. All operations from 24 to 96 hours out should be synchronized every day in the brigade operations synchronization meeting. This ensures that the BCT is supporting the RCP with maneuver elements, ISR, and rotary-wing aircraft.
- RCP missions that are not approved usually consist of—
  - ☐ Missions that require RCPs to travel on their own.
  - ☐ Missions to clear routes not in support of a BCT maneuver element requirement.
  - ☐ Missions nominated by brigade staffs to clear routes not in support of a BCT maneuver element.

Conclusion

RCPs are a critical asset to every BCT in Afghanistan. However, these assets are limited and must be tasked, managed, and employed properly. RCPs must support a BCT maneuver element conducting a mission. BCTs can either defeat the network or defeat the device in the counter-IED fight.

RCPs only defeat the device for the BCT maneuver element they are directly supporting. RCPs are not stand-alone units but support a battalion or company tasked to conduct a mission. If RCPs are not directly supporting a BCT maneuver element, then no device is defeated even if the RCP finds an IED and eliminates it. The brigade committed its RCP assets to eliminate an AAF resource, thus having a net zero gain. No mission was accomplished, the RCP was put at risk, and the AAF simply reseeded the route. RCPs should only support a maneuver element conducting a mission requiring freedom of movement or maneuver.

Major Law is the brigade engineer for 4th Infantry Brigade Combat Team, 4th Infantry Division, Fort Carson, Colorado. Past assignments include detachment commander and battalion operations officer, 3d Battalion, 361st Engineer Regiment, 5th Armored Brigade (Training Support Brigade), Fort Carson; assistant brigade engineer, company commander, 44th Engineer Battalion, 2d Infantry Division, Republic of Korea; platoon leader, 618th Light Equipment Engineer Company, 82d Airborne Division, Fort Bragg, North Carolina; and platoon leader and assistant brigade engineer, 307th Engineer Battalion, 82d Airborne Division, Fort Bragg. He holds an associate's degree in welding engineering from Ricks College, Rexburg, Idaho; a bachelor's in industrial engineering from Utah State University, Logan, Utah; a master's in geology and geophysics from the University of Missouri–Rolla (now Missouri University of Science and Technology), Rolla, Missouri; and a master's in military arts and sciences from the United States Army Command and General Staff College, Fort Leavenworth, Kansas.

LIFE AS A NATO ENGINEER

By Major Matthew F. Louvet

Individual augmentee taskings are daunting enough by themselves, but getting orders as a senior captain to be a chief engineer on a North Atlantic Treaty Organization (NATO) staff was especially intimidating. Things started to look up when I finally made contact with the British captain that I was replacing, but then I discovered that as chief engineer, I was replacing not only him, but his entire platoon as well.

The duty description did little to calm initial fears: *Advises Commander, Headquarters Support Group, on all matters concerning civil engineering and building construction support. Leads a team of more than 100 Soldiers and civilians; evaluates legal construction requirements; evaluates headquarters constructional and maintenance requirements, initiates inputs for funding, and supervises execution and quality control; develops specifications for NATO construction projects, acts as project officer, coordinates projects concerning purchasing, contracting, and local firm selection; oversees site/space management; leads military in case of specialized survey; supervises more than 25 local civilian employees; acts as technical expert during contract award committees; supervises fire department; supervises work force and prioritization of all daily work requests across the International Security Assistance Force Headquarters Camp.*

I knew I could handle the job of project manager, but wondered about acting as contract manager, technical expert in building things, and managing a fire department. After a meeting in Kabul with the British captain and his platoon, the "right seat ride" began. I learned that I would be responsible for all the daily maintenance of the camp, site management and all contract work on the camp up to €10,000, the fire department, and all NATO paperwork for the national assets that were on the camp.

At first, my crew consisted of just two air conditioning technicians, a metal worker, and three other workers for the entire camp. I was also managing large contracts for plumbing and generator support. Both helped to reduce the initial problems resulting from the limited number of workers available. As time went by, noncommissioned officers from NATO armies arrived and were assigned to our shop: an aviation electrical repair specialist, an aide de camp, a personnel specialist with experience as a construction engineer, a combat engineer, and a generator mechanic. Luckily, a contract through NATO for a civilian workforce had been started. Soon our workforce increased by two civilian managers and about 20 local national skilled laborers, and we were able to manage the approximately 20 new work orders that came in daily. From something nearly chaotic, we produced a system where work orders were dropped off at the lodging office or at our shop and then assigned a priority. The priorities were relatively fixed, so it was no problem getting jobs into the right order. This allowed concentration on contract jobs occurring outside the camp's daily maintenance.

There were usually 8 to 10 job sites—separate from routine maintenance on the camp—to be supervised daily. By the end of my six-month rotation, there were 20 or more companies available to bid on each job. To bring in a contractor, job requests had to be outside the scope of the local workforce. The NATO equivalent of a performance work statement would be drawn up and taken to the contract office. Representatives from interested companies were escorted individually to the sites and told what they would have to accomplish. Bids were reviewed and the company chosen. After the contract was written and signed (and security checks performed), work times were coordinated so that the company's workers could get on the camp with whatever materials they needed. After that, all that was required was supervision, quality control and, finally, approval of the completed project.

Escorting contractors individually became a job in itself. Eventually a system evolved with a weekly tour, lasting from one to three hours, with all the contractors who wanted to bid on current jobs. The contractors then had a week to bid on all the jobs they wanted. (Emergency jobs were awarded based on the ability and history of the contractors.) The system made things run smoothly,

Afghani contractors replace a concrete roof at the International Security Assistance Force headquarters camp.

especially for the contracting office that handled all the paperwork.

Working in a NATO environment had its own set of challenges. For example, there were security issues of getting local nationals into secure areas to make repairs. To ensure proper supervision, the facility security force was assisted by someone from whatever shop needed the repairs. If escorts were not available on a particular day, repair jobs were time-shifted, adding another layer of negotiations to the process.

There was also a grey line dividing NATO jobs from national jobs. The NATO work force was not funded to perform work for the national assets that resided on the camp. It did perform such work, but costs were billed directly to the country involved. If the NATO engineer shop had not done repairs for the individual nations, the nations would have had to hire, escort, and pay their own contractors to get the work done. None of the national elements had the same knowledge of local contractors as the NATO engineer office, which was able to satisfy all the NATO and national assets.

The NATO chief engineer was responsible for keeping data, which was reported monthly to NATO headquarters, on the square footage occupied by each country. This number was translated into a dollar amount and billed to the individual countries. Managing the land inside the compound became an exercise in negotiations as the individual countries sought to expand their footing on a camp with limited space. Also, there were other agencies working as part of NATO that wanted to establish themselves on the compound. Any new construction or expansion brought with it an increase on the electrical load, water consumption, and space requirements for new personnel.

The easiest part of the job was managing the fire department. It was a contract job with two shifts that worked onsite for six months each. Thankfully, there was no need to call on them to perform their duties.

The tasker offered a wealth of knowledge, although that was not obvious until it was finished. Project management was essential to successfully performing the task at hand and keeping the leaders happy. A good crew of workers, from all walks of life and backgrounds, was critical to the success of every undertaking. Without the international help and the local contractors, the little team would never have been able to deal with all the daily work orders and ongoing contracted projects.

Major Louvet was the chief engineer for the International Security Assistance Force headquarters camp while on a six-month Worldwide Individual Augmentation System tasking. He is the brigade engineer at 3d Brigade Combat Team, 1st Infantry Division, Fort Knox, Kentucky.

LEVERAGING THE DEPLOYABLE COMMAND POST

By Major Jon Brierton

In 2008, engineer units in the United States Army Reserve completed transformation to a fully modular force. Nearly all the engineer units struggled with turning in old equipment and reorganizing their formations to the new modular structure. With the new modular organization finalized, the question arose: Do engineer modularity and the deployable command post (DCP) concept and structure work in the Army Reserve? The old models of legacy formations and operations worked for a legacy force, but will they work for a modular force, and how do we function day to day with DCPs?

Making the Concept Work

This article describes how the 463d Engineer Battalion makes modularity and the DCP concept work in the Army Reserve. The battalion has been able to leverage the concepts of modularity through a mix of current doctrinal and legacy staff functionality. The derived command post configurations enabled the staff to effectively provide command and control across the battalion's sphere of influence.

As the new operations (S-3) officer of the 463d, which was newly reorganized as a modular engineer battalion, I was uncertain how the modular staff was supposed to function. I sought guidance from the battalion commander on his intent and vision for the command. Furthermore, I consulted with my peers and other field grade engineer officers across the Army Reserve to see what other units were doing, what techniques were being used, and what issues and challenges they were dealing with. My goal was to seek out and leverage the best tactics, techniques, and procedures rapidly in order to develop a plan that would meet the battalion commander's intent of maximizing training time for operations in preparation for a potential deployment the following year.

Doctrinal Foundation

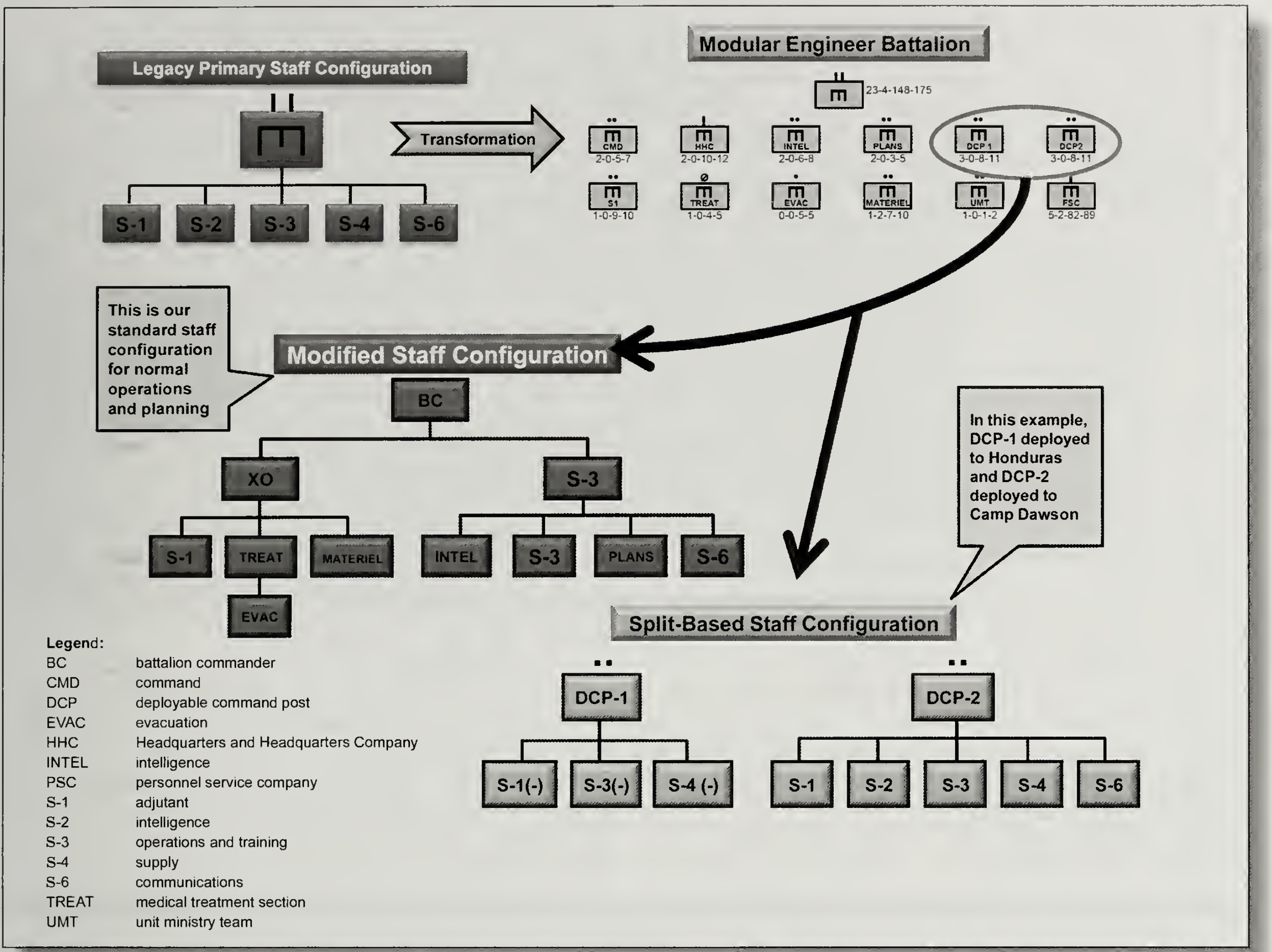
The DCP construct dates back to 2003 as a concept in the Objective Force Initiatives for higher-echelon headquarters staffs configuring for contingency operations. Today, we see engineer brigades and higher commands operating DCPs in Iraq and Afghanistan. The two DCPs operate on a cyclic rotation, with DCP-1 planning and executing a given operation while DCP-2 is planning the next operation or standing down for resupply/recovery. The DCP concept provides flexibility and continuous battle command for full spectrum operations.[1] Both DCPs can perform independent operations in noncontiguous areas of operations.[2] According to the table of organization and equipment (TO&E) unit reference book published by the United States Army Maneuver Support Center (now the United States Army Maneuver Support Center of Excellence [MSCoE]), the doctrinal purpose of the DCP for a modular engineer battalion is to exercise battle command over dispersed locations or to augment the brigade troops battalion of maneuver brigade combat teams.[3] The reference also provides the layout for each of the two DCPs and descriptions of personnel and equipment authorizations.

Operational Environment

In general terms, Army Reserve units are either preparing for or executing battle assemblies or extended combat training operations or conducting missions in an area of responsibility to support contingency operations. In today's era of persistent conflict, many Army Reserve units do all of the above simultaneously. Further, as a result of numerous deployments to support contingency operations and many other external factors, unit personnel strength is declining and more Soldiers are nondeployable. The effects include undermanned staffs with essential or primary positions filled by lower grade or less-experienced personnel. This is not necessarily a bad thing, because it provides opportunities for junior Soldiers to step up and perform at the next level, ultimately improving our junior leader core leadership attributes. However, all these factors make planning and executing operations even more difficult. Combine these factors with an aggressive Army Force Generation "available" year training plan developed in preparation for a deployment, and the outcome is a battalion leadership triad faced with a complex synchronization and resource challenge.

Concept Challenges

While reflecting on the DCP doctrine, consulting with peers, and observing higher headquarters trying to operate daily under the DCP construct, it became apparent during battle assembly/home station periods that the DCP concept inhibits staff cohesion. Further, it degrades unity of effort by promoting stovepiping and additional battle rhythm requirements. One reason it did not work was that the staff members who transformed the unit—and had a better understanding of how to



This is our standard staff configuration for normal operations and planning

In this example, DCP-1 deployed to Honduras and DCP-2 deployed to Camp Dawson

Legend:

BC	battalion commander
CMD	command
DCP	deployable command post
EVAC	evacuation
HHC	Headquarters and Headquarters Company
INTEL	intelligence
PSC	personnel service company
S-1	adjutant
S-2	intelligence
S-3	operations and training
S-4	supply
S-6	communications
TREAT	medical treatment section
UMT	unit ministry team

Figure 1

operate under the modular concepts—were gone, due to promotions and other transfers. The new staff members did not fully grasp the new concepts and complexities of operating under the DCP construct. Another reason was that there were not enough Soldiers assigned, and the battalion could not afford to have the staff split and going in two separate directions. Staffs operate better under a legacy construct and mentality because it is familiar and has proven to work efficiently. However, when the battalion transitions from a training focus to an operational focus conducting split-based or decentralized operations, the DCP concept works because it provides flexibility and effective command and control.

Concept Incorporation

As the start of the new training year approached, the battalion staff developed an aggressive plan to leverage training events in order to set conditions for a potential deployment while continually striving to improve readiness. The MSCoE unit reference book provides a doctrinal DCP organizational template that is in line with the unit manning roster. However, this configuration does not always fit every situation. The first order of business was to develop DCP structures that would best fit the battalion's situation and training plan for both normal and split-based operations (Figure 1). For normal operational periods, the staff was configured in legacy functional roles with the executive officer (XO) in charge of the adjutant and supply staff primary officers, and the S-3 officer was in charge of the intelligence, communications, and S-3 section (which included plans). This staff configuration would not work for split-based operations, because not all staff functions reside under one of the battalion field grade officers. Many other situations and external influences required alterations to the standard DCP structure as well. For instance, according to doctrine, the DCP-1 commander is the battalion XO. However, in this instance, the XO was not available for the mission, so the battalion commander led DCP-1 and the S-3 officer led DCP-2.

One of the key attributes of modularity is tailorable "plug-and-play" functionality. The DCP offers the same tailorable flexibility. The DCP-1 staff was formulated and manned with approximately 14 personnel to achieve command and control of engineer forces conducting construction operations to support Operation Beyond the Horizons in Honduras. Logisticians who focused their efforts on providing operational and

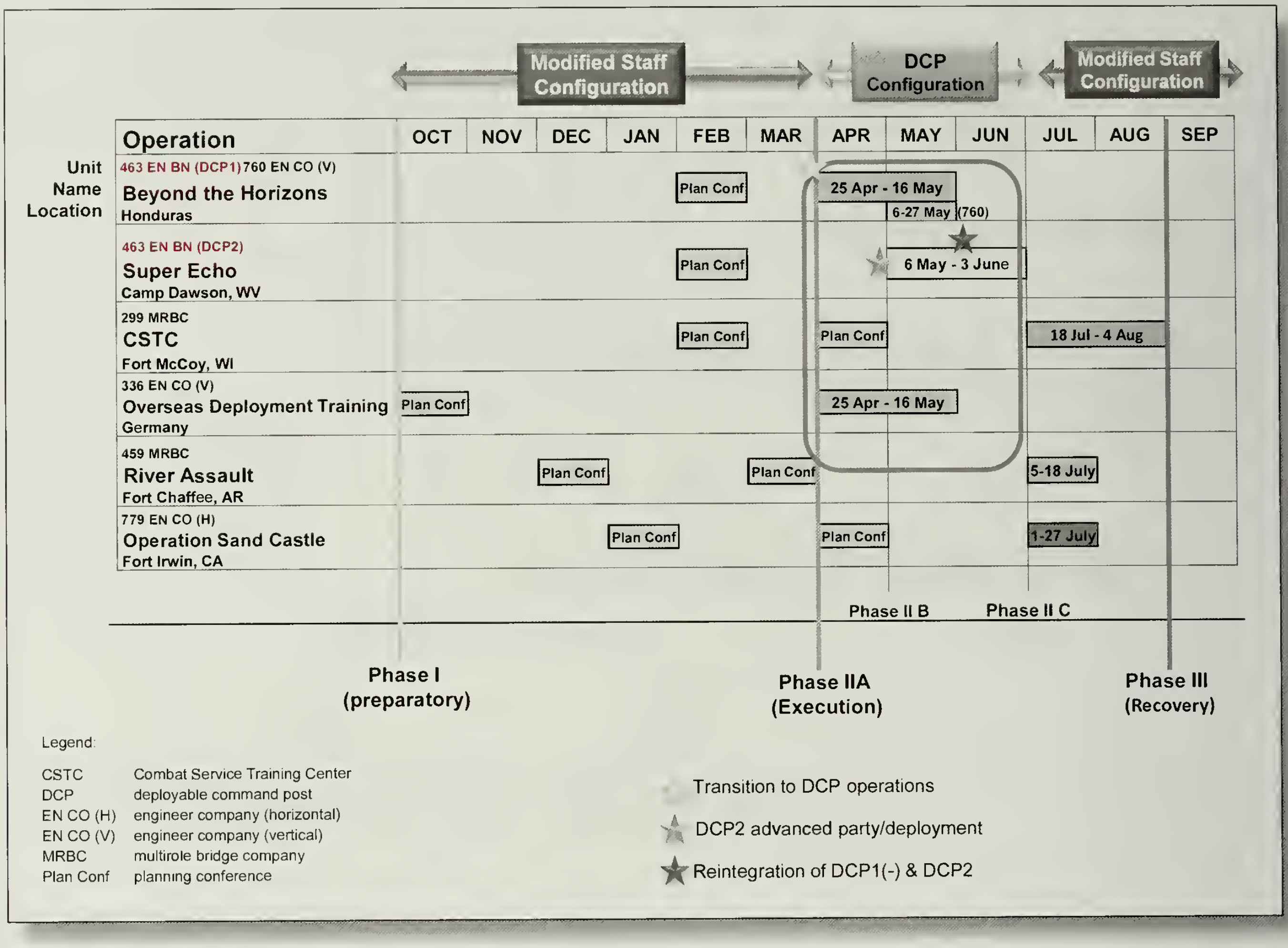


Figure 2

engineer logistic support to the Beyond the Horizons rotational task force comprised the majority of the DCP-1 staff. To manage expectations and provide some predictability, the battalion developed a phased approach to meeting training goals, fulfilling operational requirements, and meeting the commander's intent (Figure 2).

Phase I. During this phase, the plan established expectations and provided task and purpose for the battalion and all of the subordinate units by phase. The battalion operated along legacy functional staff lines and maintained the normal battle rhythm.

Phase II. As we approached Phase II, battle rhythm requirements increased, and we transitioned into DCP staff configurations.

- During Phase II-A, the battalion commander and his DCP-1 staff deployed to Honduras to support Operation Beyond the Horizons, while I led DCP-2, consisting of the remainder of the staff, in Wheeling, West Virginia. DCP-2 was responsible for maintaining situational awareness and battle tracking of DCP-1 in Honduras and the 336th Engineer Company in Germany. DCP-2 was also setting conditions for subordinate unit extended combat training while conducting day-to-day operations and preparing for our deployment to Camp Dawson, West Virginia, to support Operation Super Echo, the 412th Theater Engineer Command's course to combine military occupational specialty (MOS) 21J, vertical construction operator, with MOS 21E, horizontal construction operator.
- During Phase II-B, DCP-2 deployed to Camp Dawson and hosted Operation Super Echo while concurrently providing tactically focused extended combat training for headquarters and field service companies and maintaining situational awareness and battle tracking across the battalion. Midway through Phase II-B, DCP-1 redeployed to the continental United States and joined DCP-2 at Camp Dawson. With both the command posts together at Camp Dawson under the battalion commander, the staff reassembled and resumed normal functionality and planned for future operations for the remainder of training year 2009 and the first quarter of training year 2010.

Lessons Learned

To meet the commander's intent and improve readiness across the battalion, the major points to make the DCP concept work are to—

(Continued on page 56)

The Role of the Engineer School in Collective Training

By Mr. Shawn M. Bowen

There are probably more glamorous subjects to read about, but this one is important to everything we do—every day—in the Army: *standards*. There is a standard established for every task that we do in the course of our daily efforts. But how do we determine the correct standard? In the engineer field, this is done by the Collective Training Division (CTD) at the United States Army Engineer School. Anyone out in the field who has not visited the Engineer School may have no idea about what CTD does. Since individuals in CTD are either retired or active duty military, they consider the same questions you have. Training management in today's modular Army is confusing to many, and regardless of the technologies available, most people are too busy to spend their time looking for the latest and greatest items available. The biggest problems for training management seem to be—Who does what? Where do I find it? Whom can I talk to? What is the phone number? For example, a unit executive officer had been searching for collective task outlines for more than a month when he stumbled onto a link to CTD, allowing us to quickly steer him in the right direction for all of his training management needs. The first question—Who does what?—is easy; answers to the remaining questions above can be addressed to the telephone contact or at the online site at the end of this article.

Collective Training Division

CTD is an organization within the Engineer School Directorate of Training and Leader Development (DOTLD) that is responsible for the analysis and development of all collective training products for every engineer unit in the Army. The chief of CTD works for the DOTLD. There are currently five civilian employees and two senior noncommissioned officers (NCOs) assigned to the division. These NCOs typically have had extensive platoon sergeant experience and recent deployments to today's operational theaters. Civilians, along with their institutional knowledge, bring their experience of writing tasks and developing training products for the field. These combined attributes offer a fresh perspective to training product development.

Combined Arms Training Strategy

The engineer field has 18 different military occupational specialties (MOSs). CTD develops collective training and evaluation outlines (T&EO) for each MOS. Combined Arms Training Strategy (CATS) products have replaced the Army Training and Evaluation Program (ARTEP) manuals. As the Army's overarching strategy for current and future training of the force, CATS is designed for use within the Army Force Generation (ARFORGEN) cycle—enabling the unit to ramp up its training intensity according to its deployment cycle. The basis for CATS is a series of proponent, unit, and institutional strategies describing training events, frequencies, and resources required to train to standard—and describing how the Army will train the total force to standard in the institutions and units. CATS also documents the quality and justification for all training resources required to execute the training. Collective task outlines are accessible through Digital Training Management Systems (DTMS).

Full Spectrum Operations Mission-Essential Task List

The Engineer School, in conjunction with the Combined Arms Center–Collective Training Division (CAC–CTD), is responsible for the development of the theater engineer command and engineer brigades' full spectrum operations (FSO) mission-essential task list (METL). The review of the FSO METL is conducted semiannually by the Army METL Review Board (AMRB), which ensures that the Headquarters, Department of the Army (HQDA)-approved standardized FSO METLs are synchronized with—

- Strategic environment as defined by the Army Training and Leader Development Guidance (ATLDG) and ARFORGEN.
- Table of organization and equipment (TO&E)-designed mission (mission profile) of selected Army brigade and higher-echelon units.

- Any changes in doctrine and the regulations governing task design.

CAC is the HQDA executive agent for the FSO METL, which represents those minimum fundamental doctrinal tasks that a unit was designed to perform in any operational environment.

A standardized FSO METL provides the readiness community a yardstick with which to compare the readiness of like units, while providing unit leaders the flexibility needed to focus on those fundamental METL tasks that need training. Unit leaders train on FSO METL supporting tasks and under conditions that support mission readiness. Commanders will use HQDA-approved, standardized METL and focus training on the METL tasks not assessed as "trained." Units will train on one METL—their FSO METL, which is augmented only when the unit is assigned a mission it was not designed to perform. If the assigned mission is outside of the unit's core functions/designed capabilities, the commander will analyze the assigned mission, identify the mission-essential tasks and, if necessary, add additional tasks to the unit's FSO METL as a temporary modification to accommodate the assigned mission.

Technical Rescue Collective Tasks

The newest additions to the engineer collective tasks are technical rescue (TR) tasks, which enable engineer leaders to enhance the training strategy for civil support operations. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (known as the Stafford Act) is the primary federal statute giving the President power to direct federal agencies to provide assistance to state and local authorities during an incident. The purpose of this assistance is to save lives, alleviate human suffering, protect public health and safety, and lessen or avert the threat of a catastrophe. In the past, engineers have provided civil support and most certainly will be called on in the future to do so. It is imperative that engineers have the knowledge and trained capabilities to assist state and local governments in time of need. TR is a complex operation combining Department of Defense personnel and civilian first responders. Legal thresholds and certifications are areas of concern, but there is no doubt that bringing engineers to the fight dramatically enhances capabilities and saves lives.

CTD Access and Contact

Through the Army Knowledge Online (AKO) site for Engineer Collective Training, you will have access to the above-mentioned products and the people within CTD. For further information about training management, call (573) 563-6237.

Mr. Bowen is a training developer for the United States Army Engineer School Collective Training Division at Fort Leonard Wood, Missouri. He retired from the Army after 20 years of service and holds a bachelor's in business administration from Columbia College in Columbia, Missouri.

("Leveraging," continued from page 54)

- Alter the task organization to fit the situation in order to leverage flexibility during split-based or decentralized operations.
- Operate as a legacy functional staff during normal operational periods with the XO or DCP-1 commander overseeing the adjutant and supply staff sections, while the S-3 or DCP-2 commander oversees the intelligence, S-3, and communications staff sections.
- Synchronize staffs jointly between the XO at DCP-1 and the S-3 at DCP-2.
- Develop depth on the bench by empowering NCOs through cross-training in multiple staff section roles while inculcating the traits of agility and flexibility.
- Ensure staff situational awareness and understanding by maintaining a common operational picture and battle rhythm.

Ultimately, the DCP concept was designed to enable flexibility and provide continuous battle command. This does not necessarily mean that DCP-1 is the day shift and DCP-2 is the night shift or vice versa. However, they could function that way if the situation dictated.

Conclusion

The DCP construct, coupled with synchronized staff actions, enables the battalion to maintain unity of effort during split-based operations or deployments while retaining agility and flexibility. Although not the textbook example, the 463d Engineer Battalion was able to leverage the capabilities of the DCP concept and the junior staff to meet the commander's intent. Furthermore, through executing the lessons learned, the 463d improved readiness within the battalion and across the 412th Theater Engineer Command.

"Hammer On, Drive It Home!"

Major Brierton is the executive officer of the 463d Engineer Battalion. He has served as the chief of operations for the 412th Theater Engineer Command, deployed to Iraq as the plans officer and battle captain for the 983d Engineer Battalion, and commanded a light equipment engineer company. He is a graduate of the United States Army Command and General Staff College, Fort Leavenworth, Kansas, and holds a master's in organizational management from the University of Phoenix.

Endnotes

[1] Field Manual 3-34, *Engineer Operations*, April 2009, p. 2-9.

[2] United States Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-01, *United States Army Objective Force Battle Command (C4ISR) Concept*, 2003, p. 43.

[3] Maneuver Support Table of Organization and Equipment Reference Book, United States Army Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri, April 2008, p. 9-22.

THE NEED FOR DEDICATED TECHNICAL RESCUE COMPANIES

By Staff Sergeant Jesus B. Cuartas

Technical rescue is a discipline most commonly associated with civilian firefighters and local emergency responders, but the principles of technical rescue are exercised quite frequently throughout the Engineer Branch of the United States Army. Technical rescue refers to those aspects of saving life or property that employ the use of tools and skills that exceed those normally reserved for firefighting, medical emergency, and rescue crews. These disciplines include the following:

- Rope rescue
- Swiftwater rescue
- Confined-space rescue
- Ski rescue
- Cave rescue
- Trench/excavation rescue
- Building collapse rescue[1]

Although the Branch is consumed by the need to sustain combat, geospatial, and general engineering operations throughout the world, the fourth element of operations—civil support—must not be overlooked. The United States Army is continually called on to serve at home and abroad in response to natural and man-made catastrophes. In 2001, the Army helped after the attacks of 11 September; in 2005, it responded to Hurricane Katrina; and in 2010, it sent troops to help after the catastrophic earthquakes in Haiti on 12 January.

In 2002, United States Northern Command (NORTHCOM) was established to assist federal homeland defense efforts and coordinate support for civil authorities. Since then, three brigades have been scheduled to serve as Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive (CBRNE) Consequence Management Reaction Forces (CCMRFs). Although tailored to CBRNE events, a natural prerequisite exists for the incorporation of a technical rescue element within these brigades. Most of the contingency plans require that the military provide elements to help coordinate and execute response to events perpetrated against the United States.

In July 2009, the commander of NORTHCOM testified before Congress about the CCMRF's composition and capabilities. He explained that a CCMRF is a task force of approximately 4,700 people that operates under the authority of Title 10. It is self-sustaining and may be tailored to any CBRNE event. A CCMRF is composed of units with unique CBRNE training and equipment from the Army, the United States Marine Corps, the United States Navy, the United States Air Force, and general purpose units trained to operate in proximity to a hazardous or contaminated environment. CCMRF capabilities include the following:

Soldiers from the 911th Engineers perform search and rescue operations at the Pentagon after the 11 September 2001 attack.

- Event assessment
- Robust command and control
- Comprehensive personnel and equipment decontamination
- Hazardous material handling
- Air and land transportation
- Aerial evacuation
- Mortuary affairs
- General logistical support to extended operations

Although focused toward United States Army Chemical Corps responsibility, a dedicated technical rescue company providing rescue efforts would alleviate some of the burdens of the chemical response force, allowing it to focus primarily on the chemical response. According to a former commander of the Army's 911th Engineer Company (Technical Rescue), Fort Belvoir, Virginia, CCMRFs already have a technical rescue capability requirement. CCMRF-1 uses a chemical-biological incident response force platoon and CCMRF-2 and CCMRF-3 use United States Army Reserve firefighting detachments combined to form a platoon-size capability. However, a platoon-size element cannot conduct sustained technical rescue operations, especially in response to a major collapse mission. The CCMRF also has a heavy equipment requirement, which has been filled by the Air Force.

If a company structured the same as the 911th were established, it could provide an immediate capability even greater than that of typical civilian first responders. It could provide an intermediary between civilian and Department of Defense (DOD) responders, and also provide assets such as heavy lifting capabilities through the use of engineering equipment not commonly found outside of dedicated Federal Emergency Management Agency (FEMA) task forces located nationwide.

DOD now has two units with bioterrorism response capabilities—the Army's Technical Escort Unit and the Marine Corps's Chemical-Biological Incident Response Force. Separating the technical rescue aspect from these elements and structuring self-sustaining units focused on technical rescue would allow mobilization of the elements to disasters without compromising the overall effectiveness of our national security posture.

The U.S. response to the 12 January earthquakes in Haiti illustrates the need to strengthen the nation's technical rescue response capability. U.S. military engineers used heavy equipment to clear rubble obstructing rescue sites and assessed the stability of damaged structures. While focusing on the restoration of essential public services such as electricity and water, U.S. military engineers also had an important role to play in search and rescue activities, working with civilian structural experts from the United States Army Corps of Engineers. Personnel trained in multiple aspects of technical rescue are in extremely high demand, and FEMA task forces from all over the nation were deployed to conduct rescue operations after the earthquakes. It was the first time that California Task Force 1 (CA-TF1) from Los Angeles was deployed as an entire element of more than 200 personnel.

Unfortunately, once Los Angeles's best-trained personnel were deployed to Haiti, California itself suffered from catastrophic landslides resulting in a need for technical rescue personnel to respond. If more Soldiers who deployed to Haiti had been ready to perform urban search and rescue operations without on-site training, perhaps more CA-TF1 personnel could have remained stateside to perform their missions of national response. An alternative plan would be for the Army to send a small element, proficient in technical rescue, embedded in DOD assets such as FEMA. The technicians in that element could bridge the gap between military and civilian responders, knowing how to allocate assets and which military personnel were best suited to the situation.

A 911th Soldier practices a complex highline rope rescue at the Fort Belvoir, Virginia, hospital.

Looking downrange also highlights the possible need for elements trained and equipped to conduct technical rescue operations. Some of the skills—especially rope rescue—associated with technical rescue could be essential. Also, being able to provide relief efforts after insurgent attacks could greatly aid in the campaign of winning over the trust of the local populace. On numerous occasions in Iraq, civilians tried to handle rescue efforts following large-scale insurgent attacks. Having elements trained, or being able to train, local responders in rescue efforts would show our continual dedication to improving local conditions. Already in place within the armed forces are elements that serve as combat search and rescue (CSAR) teams. One element in the forefront in these operations is the United States Air Force CSAR teams. According to one estimate, 2,800 lives have been saved by Air Force CSAR since 2001.[2] The Air Force even has a specialty—combat rescue officer—which was created to help strengthen the service's ability to conduct personnel recovery. One phase of the combat rescue officer course focuses specifically on technical rescue.

Having engineer companies or components trained in technical rescue would greatly strengthen the Army's response capabilities when called on to deploy for support operations throughout the world. A United States Government Accountability Office (GAO) report about Hurricane Katrina stated: "Several factors affected the military's ability to gain situational awareness and organize and execute its response, including a lack of timely damage assessments, communications difficulties, force integration problems, uncoordinated search and rescue efforts, and unexpected logistics responsibilities. Without detailed plans to address these factors, DOD and the federal government risk being unprepared for the next catastrophe."[3] Task forces composed of air assets, medical personnel, and construction engineers were developed and put into play. On multiple occasions throughout the GAO report, the call for a structured military element to coordinate and execute search and rescue efforts—from the actual efforts to the logistical planning and coordination—was highlighted. The report emphasizes the inability to find common ground between civilian and DOD elements to allow a fluid response. One issue is a lack of common terminology, which is a key component of the National Incident Management System used by civilian authorities to coordinate joint efforts at an emergency site.

Soldiers from the 911th Engineers practice sling loading while the immediate response team prepares to lift off.

Having engineers throughout key response divisions such as the 82d Airborne Division would greatly enhance their response efforts. Sending selected Soldiers and officers to technical rescue training with the 312th Training Squadron at Goodfellow Air Force Base, San Angelo, Texas, and the 911th Engineer Company could ensure that the military had personnel trained in rescue who could respond to future incidents. There are already officers throughout the Army who are dedicated to the coordination of federal, civilian, and DOD operations, but having lower-echelon personnel who can coordinate those elements could greatly improve efficiency. Having a foundation in various rescue disciplines would permit an easy transition from Soldier to first responder. This would eliminate the need to get on-the-spot training on marking buildings according to FEMA standards or conducting personnel search and recovery using the right tools.

The Engineer Regiment's motto of "Essayons" is demonstrated, time and time again, as members of the 911th Engineer Company show their resiliency and no-quit attitude on every rescue operation. Establishing that capability in key regions throughout the nation would greatly contribute to the Army's overall readiness posture when performing civil support operations.

Staff Sergeant Cuartas is the operations noncommissioned officer (NCO) and information management officer for the 911th Engineer Company, 12th Aviation Battalion at Fort Belvoir, Virginia. Previous assignments include team leader, battalion unit-level logistics system–ground NCO, and platoon leader's gunner with 1st Infantry Division, Fort Riley, Kansas. He has deployed twice for Operation Iraqi Freedom.

Endnotes

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[2] Michael Fabey, "U.S. Air Force Battles to Keep CSAR Mission," *Aviation Week*, 13 January 2009.

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Family Readiness in the ARFORGEN Cycle

By Captain Kyle P. Moore and Mrs. Erica G. Koelder

Since the Army Force Generation (ARFORGEN) cycle of *Reset–Train / Ready–Available* was established in 2005, units and installations throughout the Army have been viewing all aspects of readiness, training, and Army life though this new lens. The executive officer of 1st Engineer Battalion, Fort Riley, Kansas, framed the sustainment and logistics plans, and the battalion operations and training officer framed the training plan for the battalion around ARFORGEN. The 1st Infantry Division chief of staff directed the assistant chief of staff for resource management to come up with new graphics and charts to show how units spend operational funds based on this cycle, rather than on a fiscal year. However, family readiness is still not framed in terms of ARFORGEN.

Family readiness is a task outlined to all commanders in Army Regulation 600-20, *Army Command Policy*. Units give it a high priority, but there is no standing operating procedure or guideline stating what the unit's family readiness goals should be within the ARFORGEN cycle. This article contains a comprehensive guide on specific tasks and goals for family readiness during each phase of the ARFORGEN cycle. The significance of this guide to the Engineer Regiment is that companies and battalions often deploy separately from the battalion or brigade to which they are assigned in the garrison environment. A company that deploys separately from its battalion will not necessarily have the support of a battalion staff when conducting the military decisionmaking process. This can leave family readiness tasks within the ARFORGEN cycle up to individual leaders. The solution is to establish an ARFORGEN plan that includes family readiness.

Reset

The reset part of the cycle gives leaders the chance to reconstitute the family readiness group (FRG) and make it what they would like it to become. Everyone who has been in the Army has an FRG experience—either positive, neutral, or negative. The reset phase is the time when commanders can make the FRG experience positive for spouses and families of single Soldiers. Commanders can set the FRG's parameters: Who will be the leader? When and where will meetings occur? Is participation mandatory or voluntary?

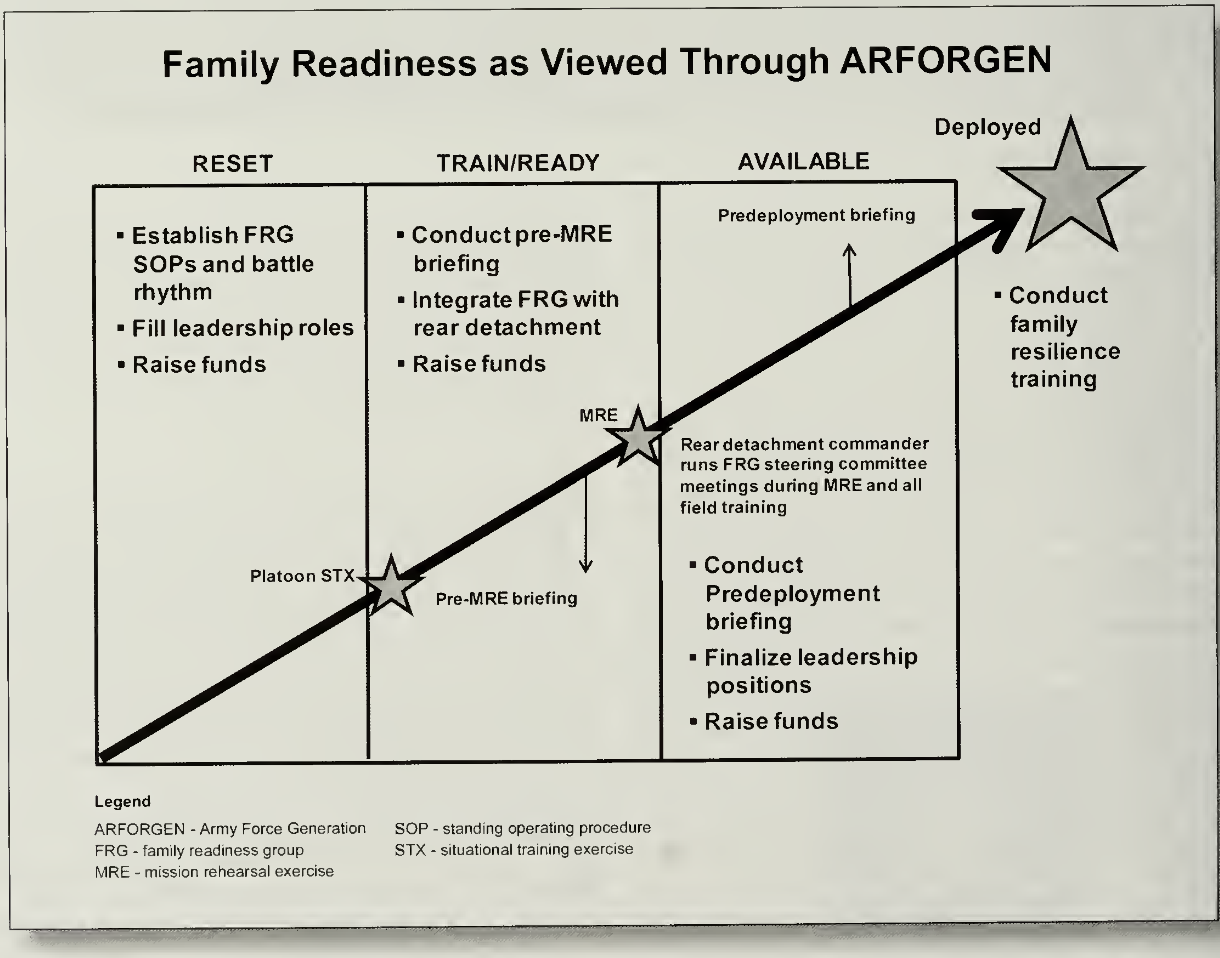
Another key component of the reset phase is the creation or continuation of a battalion-level FRG steering committee. This should be a monthly meeting led by the commander. It should be attended by the battalion commander, command sergeant major, plans and operations officer, senior FRG advisors (often the spouses of the commander and command sergeant major), family readiness support assistant (FRSA), rear detachment commander and first sergeant, and all the FRG leaders. By making this meeting a habit early and often, everyone will see what will occur in the months to come. The team building done in this phase will assist the group in problem solving while the unit is deployed. By setting the standard during this phase, the unit will be able to establish a normal battle rhythm that all FRG members can anticipate. The Army family thrives on schedules and knowledge of events.

Train/Ready

This is the stage where it will become apparent to an astute leadership group that it is too late to start forming a positive, well-functioning FRG. During this time, the unit is preparing to conduct a mission rehearsal exercise (MRE), often at the National Training Center at Fort Irwin, California, or the Joint Readiness Training Center, Fort Polk, Louisiana. This is a great opportunity to hold a pre-MRE briefing for the unit Soldiers and families. The rear detachment leaders will get their first taste of how their team will form in the absence of the main body. By taking advantage of the main body's absence and working through an MRE briefing, both the rear detachment element and the Soldiers and families will be able to prepare for the upcoming deployment. In addition, it is the first opportunity for the families to build a trusting relationship with the rear detachment. There are some Armywide factors that go into a successful MRE briefing. These include, but are not limited to—

- A briefing led by the senior commander deploying to the MRE.
- Rear detachment leader attendance to give the families a proper introduction.
- Army Community Service presence to show families the resources available.
- FRG leader involvement to show the families who will be their first line of information from downrange.
- After action review feedback from the FRG steering committee members.

This pre-MRE briefing can also be used as a dress rehearsal for the predeployment briefing given during the available stage. It is up to the leaders to give families as much of an opportunity as possible to ask questions and get involved in the upcoming deployment. This empowers the families to make smart decisions leading up to the Soldiers' departure and to continue to make smart decisions on behalf of the Soldiers while they are gone.



Family Readiness as Viewed Through ARFORGEN

RESET
TRAIN/READY
AVAILABLE
Deployed
▪ Establish FRG SOPs and battle rhythm
▪ Fill leadership roles
▪ Raise funds
▪ Conduct pre-MRE briefing
▪ Integrate FRG with rear detachment
▪ Raise funds
Predeployment briefing
▪ Conduct family resilience training
MRE
Rear detachment commander runs FRG steering committee meetings during MRE and all field training
Platoon STX
Pre-MRE briefing
▪ Conduct Predeployment briefing
▪ Finalize leadership positions
▪ Raise funds
Legend
ARFORGEN - Army Force Generation
FRG - family readiness group
MRE - mission rehearsal exercise
SOP - standing operating procedure
STX - situational training exercise

Available

This is the calm before the storm. The center of gravity for family readiness in this phase is a predeployment briefing, which should be a reflection of the pre-MRE briefing, made better by the after action report comments received a few months earlier. Keeping the same "shape" to the meeting allows the families to become familiar with the process. On top of the components from the MRE briefing, a deployment book or packet should be distributed to all Soldiers, single and married. The deployment packet should include items such as—

- A checklist of important documents.
- A list of all applicable powers of attorney.
- Red Cross information.
- FRG and rear detachment contact information.
- Other information required by the command group.

Commanders and FRG leaders should be stationed at tables so that families can update family information forms and interact with each other. Another station should be set up for single Soldiers to remit their packets to a selected staff member. This packet should be mailed to the Soldier's next of kin (as established on the family information form, DD Form 93, *Record of Emergency Data*, and Servicemembers' Group Life Insurance forms.) Depending on the size of the unit and the number of missions it will be serving, the event may need to be conducted over several days. Again, an after action report should be conducted with the FRG steering committee members to identify any unresolved issues brought up by the families at the event. The rear detachment and the FRG steering committee should take the lead on addressing the issues to give further confidence in the program's legitimacy and competency in the eyes of the families.

Not paying proper attention to the FRG during this phase has potentially dangerous consequences. Families preparing to stay behind may feel isolated if they aren't encouraged to interact with others. This feeling of isolation could lead to trouble if families don't know where to turn if problems arise and don't use all the installation's available resources and activities. Families experience many stressors at this time, and leaders should work to identify potential problems.

An unfortunate reality is that many Army units only begin to set up their FRGs during this phase of the ARFORGEN cycle. The unit training calendar and operations tempo make it difficult to assign a high priority to family readiness. Commanders are juggling packing and shipping equipment, maximizing time off by granting leave and passes, and closing the training gaps identified in after action reports following the MRE. In addition, many families may feel overwhelmed and less willing to volunteer than in other phases of the ARFORGEN cycle.

Mission at Home

Once the unit is deployed, the job of the FRG and rear detachment element is just beginning. During this time, the FRG will also go through multiple cycles of departure, adoption of new routines, rest and rehabilitation leave, then welcome home. Rear detachment leaders will be responsible for all of the FRGs while the unit is gone. It is their responsibility to ensure that the families are cared for, which is no simple task during this stressful time. Planning monthly battalion- or brigade-level events; presenting a strong, visible presence by the rear detachment commander; and coordinating available resources are critical to the success of the FRGs at this time.

Another key component is preparation for redeployment. A spouse resilience training event should be scheduled approximately 30 days before a redeployment. Successful resilience training will take many things into consideration: the mission of the deployed unit; composition of the families; the physical and mental effects of the deployment on both Soldier and spouse; and general "housekeeping" information. This is a great opportunity to give the families official redeployment information about topics such as passes and block leave. Rear detachment cadre members should work with all available agencies to tailor the event to the units' specific needs.

By keeping families involved in the ARFORGEN cycle, units will help the Army fulfill its promise to take care of its Soldiers and their families. When simple steps like the ones described in this article are taken by leaders at all levels of the chain of command, units are set up for successful deployments downrange and redeployments at home.

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Note: The authors would like to thank Captain Matthew Todd and First Sergeant Anthony R. Valdez, B Troop, 5th Squadron, 4th Cavalry Regiment, for their input during the writing of this article.

USACE Takes Steps to Maintain Its Legacy in Iraq

By Mr. Vincent L. Marsh and Mr. Michael P. Scheck

The United States Army Corps of Engineers (USACE) is passing on to the Iraqi people a legacy ensuring that the reconstruction effort continues under the supervision of highly qualified Iraqi engineers. The Gulf Region District (GRD) engineers are passing on more than just engineering techniques to their Iraqi counterparts, according to the GRD commander, who has acknowledged the reconstruction effort as comprehensive—fostering legitimacy, building capacity across institutions, promoting reconciliation, and enforcing reasonable quality and schedule construction standards. In thousands of projects, GRD imparted acceptable construction, design, and job site safety practices to Iraqi engineers.

An Enduring Presence

The U.S. forces in Iraq prepared for Operation New Dawn for some time as Soldiers began to redeploy, leaving only 50,000 troops in-theater by early fall 2010 and none there after 2011. As a result, USACE reviewed a number of contingencies for that end state. However, as all engineers know, time is a relative term when dealing with construction projects. The USACE GRD is the enduring Corps presence in Iraq, having been scaled back from a division and three districts during the past year. The district is currently working on options to deal with project completion tasks that will linger past the USACE end state in Iraq. One option USACE has been aggressively promoting is the hiring and training of local Iraqi engineers and support personnel.

The goal of the Iraqi associate hiring initiative, according to the GRD commander, is for Iraqi engineers to garner that engineering knowledge and pass it on to their counterparts in both the government and the private construction field. As Iraqis take control of restoring their infrastructure, the training and mentoring by GRD has yielded "phenomenal" results in such areas as technical knowledge, project management, and maintenance and operation of facilities.

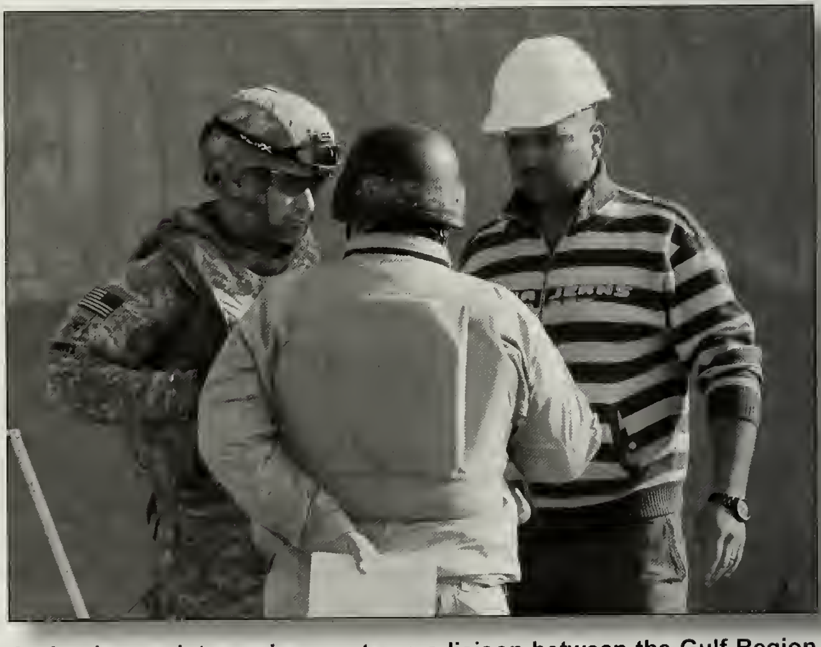
Mission and Program Purpose

The USACE mission in Iraq is to help rebuild the infrastructure and improve the daily lives of the citizens. Early on, USACE identified the need to use local national experts in engineering, safety, and construction quality assurance to help in this mission. Identifying the needs and specific skill sets for a locally hired workforce was the first step taken in a long, complex process. The next challenging step was to develop a robust local national capability that could both understand and enforce the International Building Code (IBC).

The purpose of the Iraqi Associate Program, according to the Program Management Plan, is to "develop the capacity of professional Iraqi engineers to independently perform construction management, engineering, and quality assurance functions." The end result of the program will increase the institutional capacity of the Iraqi engineer field and aid in the development of the economy by allowing the Iraqi engineers to continue the reconstruction efforts initiated by their U.S. counterparts, according to the plan.

Bridging the Gap

Approximately 90 percent of the USACE projects are located in local communities far from U.S. military installations. These projects require engineers proficient in Arabic, engineering, and construction techniques to monitor their progress. These high-tech skills are currently in high demand and of limited supply in Iraq.



An Iraqi associate engineer acts as a liaison between the Gulf Region District commander and a contractor in Mosul, Iraq.

In order to ensure proper construction, USACE embarked on a mission to develop the technical capability of the Iraqi people that would enable them to interpret U.S. federal contracts and build projects to the IBC standard. This was accomplished by awarding a personal services contract that enabled USACE to bridge the gap that existed between effective contract oversight and insufficient oversight resources.

The personal services contract allowed USACE to obtain the Arabic-speaking professional engineers needed to execute its mission. This contract currently employs approximately 233 personnel who provide a broad range of skills ranging from administrative assistants, engineers, real estate specialists, senior media analysts, construction inspectors, and photojournalists. These professionals are embedded with USACE employees and learn the subtleties of the USACE mission and Project Management Business Process (PMBP) and the proper enforcement of contract terms, conditions, and specifications to build a high-quality project—on time and safely. In addition, Iraqi associates are relied on to interface with the local community, explain the project, and relay the community's concerns to USACE. This results in establishing the professionally capable workforce that builds a high-quality project and meets the needs of the Iraqi people.

Iraqi Associates

The $10 million Iraqi Associate Program is funded through the United States State Department Economic Support Fund. The capacity development program also includes an Iraqi engineer enhancement program that affords engineers—from the various ministries, university faculties, and small businesses—three- to six-month fellowships in public-, academic-, and private-sector engineering environments in the United States. To sustain the Iraqi associate partnership, the State Department has provided $45 million from the Economic Support Fund to select Iraqi academic institutions to develop curriculum and training to meet provincial government of Iraq requirements. The training program for USACE Iraqi associates includes one month of formal training, an internship, a qualification transition—where candidates convert from an Iraqi associate-funded position to a project-funded position—and follow-up continuing education workshops and webinars.

These Iraqi associates provide a vital link in the USACE construction network. At the GRD Southern Area Office, a large team of Iraqi engineers, serving side by side with USACE employees, have performed extraordinarily in all construction aspects, and their expertise and abilities have been instrumental in the successful completion of area projects. Out of nearly two dozen Iraqi engineers currently employed in the resident office, three of them work as project engineers and carry through projects with little or no supervision from U.S. engineers. Training is primarily on the job, working side by side with a project engineer—and as they learn, trainees are slowly moved up in responsibility.

Other Iraqi associates work as quality assurance (QA) representatives in the field—preparing daily reports, monitoring safety, reviewing design drawings, and ensuring that quality is maintained at the project site; the standout QA representatives are often groomed for project engineer positions. All associates attend the safety office training and are constantly reminded of the importance of safety at the job site. Other classes have included ethics training and construction management practices. The only drawback is that the best associates leave the associate program and go to the United States.

The GRD resident offices in the south have been taking the lead in hiring, training, and integrating Iraqi associates. One officer sees the key to a successful program as focusing on education and training and hires only engineering-degreed candidates, who begin early on both formal and informal training and are able to attain QA certificates of training and the Occupational Safety and Health Administration (OSHA) safety officer certification. Online training and websites (such as <*www.constructionknowledge.net*>) help familiarize associates with U.S. construction techniques.

At the outset, offices in the south recognized the importance of the Iraqi Associate Program—and as the project load got smaller, the offices began to rely more heavily on the Iraqi associates to get to job sites that are too far or take too long for U.S. personnel to visit. As projects are completed and the work force scaled back, there has been much success in placing well-qualified Iraqi engineers in other positions due to the demand for their exceptional project management skills.

Partnership and Legacy

USACE has completed thousands of reconstruction projects in Iraq in partnership with the United States government and the government of Iraq. Since 2004, USACE has completed 5,257 projects throughout Iraq, valued at more than $9.1 billion, and has more than 250 projects ongoing. The overall reconstruction effort in Iraq currently provides jobs for more than 20,000 Iraqis. USACE recognizes that its projects are in good hands under the management of the Iraqi associates. A legacy of improved safety and QA methods will be left in Iraq, and the sheer volume of projects has developed a pool of qualified contractors and inspectors who have seen what a difference a well-executed QA program can make.

Mr. Marsh is the Regional Chief of Contracting for the Great Lakes and Ohio River Division of USACE. He was previously assigned as USACE Regional Chief of Contracting–Iraq and USACE GRD Chief of Contracting. He holds a bachelor's in management from the University of Maryland and is certified in contracting (Level 3) and program management (Level 1) by the Defense Acquisition University.

Mr. Scheck works for the United States Army Corps of Engineers Gulf Region District's public affairs office.

Robotic Systems Joint Project Office-Fort Leonard Wood

By Second Lieutenant Wayland Lau and Mr. Joseph Stevens

The current operational environment has produced a number of innovative tactical enablers to support the Warfighter. One of the greatest success stories in this area of the current-day fight is the adaptation and fielding of commercial robotic systems to meet the operational needs and objectives of land forces. A result of this activity is a family of mission-specific robotic tools for combat engineers.

Background

Headquartered in Warren, Michigan, the Robotic Systems Joint Project Office (RSJPO) is the materiel solution provider for United States Army and Marine Corps unmanned ground vehicle (UGV) needs. The office began in 1988 when the Department of Defense, Army, and Marine Corps facilitated an initiative to combine their development efforts of UGVs. Initial acquisitions were used by explosive ordnance disposal (EOD) personnel to assist in the investigation and neutralization of improvised explosive device (IED) threats. Due to non-EOD mission shortfalls, additional robotic requirements were developed, including the capability to support combat engineers during route and area clearance missions.

Since its inception, RSJPO has developed—and maintains—working relationships with all Army and Marine Corps laboratories, the other uniformed Services, and various agencies. The current Fort Leonard Wood (FLW) office was established in July 2007 as part of an organizational restructuring of RSJPO to better align itself within its three functional development areas: maneuver, maneuver support, and sustainment. Assistant project managers (APMs) provide cost, schedule, and performance management support to the PM in each of these areas.

Soldiers become familiar with the TALON® during classroom training.

Soldiers practice basic control manipulation skills during TALON lane training.

Mission, Training, and Operations

The RSJPO FLW mission includes, but is not limited to–

- Conducting all operational assessments on new engineer robotic systems and payloads.
- Managing all joint engineer program-of-record (POR) systems.
- Conducting contingency and new POR system operator training.
- Supporting doctrine and tactics training development by the United States Army Maneuver Support Center of Excellence (MSCoE) Capabilities Development Integration Directorate. Maneuver support encompasses three schools: Chemical, Biological, Radiological, and Nuclear (CBRN); Engineer; and Military Police.

To meet these mission requirements, RSJPO FLW is organized into a headquarters element, two robot training divisions, and a joint robotic repair detachment (JRRD). The staff—which conducts training, maintains specialized robotics and equipment, and provides logistic support to domestic and deployed units—consists of an acquisition logistics training lead, four instructors, two robot technicians, and one supply technician.

RSJPO FLW conducts operator certification courses on all robotic systems currently fielded and intended for use by maneuver support elements. This includes both small robots and the Antipersonnel Mine Clearing System, Remote Control: M160 (MV-4B POR designation). Small robot operator courses are two days long and are conducted both at Fort Leonard Wood and at unit home stations through mobile training teams. The M160 operator course is five days long and only conducted at Fort Leonard Wood. Instructors also provide familiarization training on these systems as an embedded element of select Counter Explosive Hazards Center (CEHC) curriculums and the Engineer Warrant Officer Basic and Advanced Courses. The current training venue will likely expand in the near term as new robotic platforms become available that are designed to provide dismounted forces with the capability to perform hazardous close-quarter reconnaissance and counter-IED operations. This is all in addition to providing robotic system platforms to support Fort Leonard Wood unit training exercises and special events—such as the Best Sapper Competition and Humanitarian Demining Center demonstrations.

JRRD serves as a "one-stop shop" for UGV logistic, maintenance, and other technical support services at Fort Leonard Wood. It repairs all RSJPO FLW and CEHC robotic systems and provides maintenance support for the Explosive Ordnance Clearance Agent Course. To meet this sustainment need, JRRD maintains a 90-day parts supply inventory on all supported robotic systems.

As a POR system, the M160 is completely managed by RSJPO FLW. Currently, this includes coordinating scheduled upgrades for initial-purchase systems and the intertheater movement of all deployed systems and providing full logistic support for in-theater systems by supplying joint sustainment facilities with repair parts. RSJPO FLW instructors and JRRD personnel also provide maintenance training on the M160 to robot technicians deploying to sustainment facilities in both existing theaters of operation. Once the M160 program reaches milestone C (full production) decision, the RSJPO FLW team will be responsible for fielding these systems to engineer clearance companies by providing new equipment training teams.

Summary

UGVs have proven their ability to contribute to combat operations in both Iraq and Afghanistan, with the exponential benefit of reduced risk for land forces. As robotic technology advances, RSJPO FLW is strategically positioned at the tip of the spear to meet the fielding and sustainment needs of the Engineer Warfighter.

For further information, contact RSJPO FLW at (Commercial) 573-596-0845 or (DSN) 581-0845.

Second Lieutenant Lau is an Engineer Basic Officer Leadership Course (EBOLC) student who was attached to RSJPO, Fort Leonard Wood, Missouri, prior to starting class.

Mr. Stevens is a retired combat engineer and instructor at RSJPO, Fort Leonard Wood, Missouri.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division
Doctrine Branch, Engineer Division

Publication Number	Title	Date	Description (and Current Status)
			Newly Published Publications
FM 3-34.5 (*FM 3-100.4)	*Environmental Considerations*	Pending Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** Published 16 February 2010. Obtain from the Army Publishing Directorate or the Reimer Digital Library.
			Publications Currently Under Revision
FM 3-34	*Engineer Operations*	Apr 09	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Revising manual to incorporate the engineer lines of support framework. Estimated publishing date is 2QFY11.
			Organizational Manuals
ATTP 3-34.23 (*FM 5-116) (*FM 5-100-15) (*FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the brigade combat teams (BCTs) (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. **Status:** Final approved draft is at the Army Publishing Directorate. Estimated publishing date is 1QFY11.
			Combat Engineering
FM 3-90.4 (*FM 3-34.2) (*FM 3-90.12)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include the renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The Marine Corps is dual-designated on this manual, which will replace their Marine Corps Warfighting Publication (MCWP) 3-19.3, *Marine Air-Ground Task Force (MAGTF) Breaching Operations*. **Status:** To be published 2QFY11.
			General Engineering
TM 3-34.48 1/2 (*FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Pending Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Air Force (as well as the Navy and Marine Corps) plans to adopt the new manual also. **Status:** Estimated publishing date is 2QFY11.
TM 3-34.41	*Construction Planning and Estimating*	NEW	This new manual is being produced by the Navy, in coordination with the Army and Air Force. The manual will provide the TTP and planning factors for conducting construction planning at the crew leader level. The manual will also provide useful expeditionary construction planning factors for use by planners at all levels. **Status:** Estimated publishing date is 3QFY11.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division
Doctrine Branch, Engineer Division

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
TM 3-34.43 (*FM 3-34.451) (*FM 5-472)	*Materials Testing*	Pending Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well. **Status:** Estimated publishing date is 2QFY11.
FM 3-34.65 1/2 (*FM 3-34.465)	*Quarry Operations*	Pending Mar 05	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. There will be a focused staffing only for this manual. **Status:** Preparing Volume II. Initial Draft staffing of both volumes 2QFY11.
TM 3-34.49 (*FM 5-484)	*Multi-Service Well Drilling Operations*	Pending Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and Marine Corps includes the newest technologies, current practices, and revised formulas. **Status:** Estimated publishing date is 2QFY11.
TM 3-34.56	*Waste Management*	NEW	This manual addresses issues not currently integrated into FM 3-34.5, *Environmental Considerations*. The manual will address the role of waste management in support of deployed forces, as well as the integration of waste management throughout the operations process, including its critical linkage to the composite risk management process. **Status:** Estimated publishing date is 2QFY11.
Geospatial Engineering			
ATTP 3-34.80 (*FM 3-34.230)	*Geospatial Engineering*	Pending 3 Aug 00	This full revision of FM 3-34.230, *Topographic Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Final approved draft is at the Army Publishing Directorate. Estimated publishing date is 1QFY11.

NOTEs: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN Web site at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development and/or recently published. Drafts may be obtained during the staffing process or by contacting the Engineer Doctrine Branch at commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*> or contact commercial 573-563-2717, DSN 676-2717, or <*brian.davis6@us.army.mil*>. The development status of these manuals was current as of 29 July 2010.

***Publications shown inside parenthesis with an asterisk beside the number indicate the current published number, but that number will be superseded by the new number at the beginning of the listing. Multiple manuals in parenthesis will indicate consolidation into one manual.**

Due to the doctrine reengineering effort, some field manuals are being realigned as general subject technical manuals (TMs). These manuals will be numbered as TMs. Field manuals (FMs) dealing with Army tactics, techniques, and procedures (ATTP) will be renumbered as ATTPs.

92d Birthday of the Army Warrant Officer

By Chief Warrant Officer Five David P. Welsh (Retired)

The United States Army Warrant Officer Corps marked its 92d anniversary on 9 July 2010. An Act of the United States Congress in 1918 established the United States Army Mine Planter Service as part of the United States Army Coast Artillery Corps. Implementation of the Act by the Army was published in War Department Bulletin 43, dated 22 July 1918. A total of 40 warrant officers were authorized to serve as masters, mates, chief engineers, and assistant engineers on each mine-planting vessel. Although only one rank of warrant officer was authorized by Congress, in effect, three grades were created because of the varying levels of pay authorized for masters, first mates, second mates, and corresponding levels of marine engineer personnel. This is also when the official color of the Army Warrant Officer Corps came to be brown. It originated from the brown strands from burlap bags that the Army Mine Planter Service personnel wore as their insignia of rank.

Also in 1918, the Army opened a school, commanded by an officer who had graduated from the United States Naval Academy, to train its mariners at Fort Monroe, Virginia. In World War I, the Coast Artillery Corps was responsible for mine defenses in major ports. Vessels ranging in size from small motor boats to 1,000-ton oceangoing ships were used to lay and maintain minefields. Conflicts between Soldiers and civilian employees who manned these vessels revealed the need to ensure that the vessels were manned by military personnel.

The following selected highlights portray the rich history of the Army Warrant Officer Corps:

- The National Defense Act of 1920 provided for warrant officers to serve in clerical, administrative, and bandleader positions. This act also authorized 1,120 warrant officers to be on active duty. During this time, warrant officers were excluded from performing duties from which enlisted personnel were also excluded.
- On 12 May 1921, a distinctive insignia was approved for warrant officers. It consisted of an eagle rising with wings displayed, adapted from the Great Seal of the United States. The eagle is standing on two arrows, which symbolize the military arts and sciences. The eagle rising is enclosed within a wreath. Warrant officers of the United States Tank Corps were the first to wear this new insignia.
- In 1936, the Army was uncertain about what an Army warrant officer was and whether there was a place for warrant officers in the Army's personnel structure. Although it had given the rank to such specialties as band leaders, marine engineers, field clerks, and pay clerks, it had also used the rank as a reward for former commissioned officers who no longer met the officer educational requirements and for outstanding enlisted personnel who were too old to be commissioned and could look to no further advancement.
- In 1940, warrant officers began serving as disbursing agents. Warrant officer appointments began to occur in larger numbers for the first time since 1922. However, overall strength declined due to the significant number transferred to active duty as regular commissioned officers.
- In 1941, Public Law 230 authorized appointments of up to one percent of the total Regular Army enlisted strength. This law also established two pay grades for warrant officers—W1 for warrant officers junior grade and W2 for chief warrant officers. One other benefit of Public Law 230 was the authorization of flight pay for those involved in aerial duties.
- In November 1942, the position of warrant officer was defined by the United States War Department in the rank order as being above all enlisted personnel and immediately below all commissioned officers. January 1944 saw the authorization of the appointment of women as warrant officers, and by the end of World War II, 42 female warrant officers were serving on active duty. Warrant officers were filling 40 different occupational specialties by early 1946 and approximately 60 specialties by 1951.

- The 1949 Career Compensation Act brought two new pay rates for warrant officers. The designations of warrant officer junior grade and chief warrant officer were retained, and the grade of chief warrant officer was expanded with the addition of pay grades of W3 and W4.
- In 1953, the Warrant Officer Flight Program led to the training of thousands who later became helicopter pilots during the Vietnam War.
- The 1954 Warrant Officer Personnel Act established warrant officer pay grades W1 through W4 and officially eliminated the Mine Planter Service.
- On 21 January 1957, a new warrant officer concept, resulting from a Department of the Army study, was announced and provided the following guidelines:
  - There was a need for warrant officers.
  - The warrant officer category would not be considered a reward or incentive.
  - The first published definition for warrant officers was established in Army Regulation 611-112: "The warrant officer is a highly skilled technician who is provided to fill those positions above the enlisted level which are too specialized in scope to permit effective development and continued utilization of broadly trained, branch-qualified commissioned officers."
- In July 1972, Army warrant officers began wearing newly designed silver rank insignia with black squares, in which one black square signified warrant officer one (WO1) and two, three, and four black squares signified chief warrant officer two (CW2) through chief warrant officer four (CW4). Also in 1972, a trilevel education system was established and provided formal training at the basic or entry level for warrant officers in 59 occupational specialties. The educational system further provided intermediate level formal training in 53 specialties and formal training for 27 specialties at the advanced level.
- In 1978, United States Army National Guard and United States Army Reserve warrant officers were integrated into the Army Professional Development System. This satisfied the need for qualified, highly trained warrant officers that could be accessed for the Active Army rapidly in times of emergency.
- In 1982, the Warrant Officer Training System was established by the United States Army Training and Doctrine Command. The training system consisted of three levels: *Entry, Advanced,* and *Senior.*
- On 1 October 1984, all direct appointments of Army warrant officers ceased by direction of the Army Vice Chief of Staff. A Warrant Officer Entry Course was established at Fort Sill, Oklahoma. In the mid-1980s, a Warrant Officer Entry Course–Reserve Components was established in the Warrant Officer Training Branch at the Army Reserve Readiness Training Center at Fort McCoy, Wisconsin. This course evolved into Warrant Officer Candidate School–Reserve Components and was conducted until September 1994, when all warrant officer candidate school courses were consolidated and transferred to the Warrant Officer Career Center, Fort Rucker, Alabama.
- In 1985, the Army developed a new definition of the warrant officer that encompassed all warrant officer specialties: "An officer appointed by warrant by the Secretary of the Army, based upon a sound level of technical and tactical competence. The warrant officer is the highly specialized expert and trainer who, by gaining progressive levels of expertise and leadership, operates, maintains, administers, and manages the Army's equipment, support activities, or technical systems for an entire career."
- The National Defense Authorization Act (NDAA) for Fiscal Year 1986 amended Title 10 of the United States Code (USC) to provide that "Army chief warrant officers shall be appointed by commission." The primary purpose of the legislation was to equalize appointment procedures among the services. Chief warrant officers of the United States Navy, United States Marine Corps, and United States Coast Guard had been commissioned for many years. Contrary to popular belief, the commissioning legislation was not a Total Warrant Officer Study recommendation but a separate Army proposal. Further clarification of the role of an Army warrant officer, including the commissioned aspect, was found in Army Field Manual 22-100: "Warrant officers are highly specialized, single-track specialty officers who receive their authority from the Secretary of the Army upon their initial appointment. However, Title 10 USC authorizes the commissioning of warrant officers upon promotion to chief warrant officer rank. These commissioned warrant officers are direct representatives of the president of the United States. They derive their authority from the same source as commissioned officers but remain specialists, in contrast to commissioned officers, who are generalists. Warrant officers can and do command detachments, units, activities, and vessels, as well as lead, coach, train, and counsel subordinates. As leaders and technical experts, they provide valuable skills, guidance, and expertise to commanders and organizations in their particular field."
- In 1988, the Army established that—pending submission and approval of the new rank of CW5—warrant officers selected by a Department of the Army board and designated as master warrant officer (MW4) would be senior to all warrant officers in the rank of CW4. The MW4 continued to be paid at the W4 pay grade. In December 1988, the first class from the MW4 training course graduated and the first 30 CW4s were designated as master warrant officers.
- In 1989, a Warrant Officer Management Act (WOMA) proposal was submitted by the United States Army Warrant Officers Association on behalf of the Army to the Congress. In 1991, the WOMA proposal was considered by the Congress, and it was incorporated into the NDAA for Fiscal Year 1992. Six key provisions were

enacted based on WOMA as signed by the President in December 1991:

  - A single promotion system for warrant officers.
  - Tenure requirements based on years of warrant officer service.
  - Establishment of the rank of CW5 with a five-percent cap on the number of warrant officers on each Service's active duty list at any one time.
  - Selective mandatory retirement boards for retirement-eligible warrant officers.

- In February 1992, WOMA's provisions went into effect. On 1 October 1992, the appointment of Army warrant officer candidates to WO1 was established as the graduation date from Warrant Officer Candidate School. Prior to that date, candidates were not appointed until completion of the then Warrant Officer Technical and Tactical Certification Course for their military occupation specialty (MOS). Since certification courses for various MOSs were of various lengths, the length of time spent as a warrant officer candidate varied greatly.
- On 9 July 2004, new CW5 rank insignia and standards for wearing Army officer branch insignia and branch colors were announced as uniform changes for Army warrant officers. The CW5 insignia was a silver-colored bar, 3/8 inch wide and 1 1/8 inches long, with a black line down the center of the bar. This aligned the Army CW5 insignia with those of the Navy and Marine Corps, making the rank more readily recognizable in joint operations. Ceremonial warrant officer insignia change and flag ceremonies were held at various locations on 9 July and other dates. This change relegated the brass "eagle rising" insignia to Warrant Officer Corps history.
- On 14 October 2005, new Army warrant officer definitions were published in Department of the Army Pamphlet 600-3, *Commissioned Officer Professional Development and Career Management*. This pamphlet, which includes the career development of warrant officers, contains the new official definition of an Army warrant officer: "The Army warrant officer (WO) is a self-aware and adaptive technical expert, combat leader, trainer, and advisor. Through progressive levels of expertise in assignments, training, and education, the WO administers, manages, maintains, operates, and integrates Army systems and equipment across the full spectrum of Army operations. Warrant officers are innovative integrators of emerging technologies, dynamic teachers, confident warfighters, and developers of specialized teams of Soldiers. They support a wide range of Army missions throughout their career. Warrant officers in the Army are accessed with specific levels of technical ability. They refine their technical expertise and develop their leadership and management skills through tiered progressive assignment and education."

Department of the Army Pamphlet 600-3 follows these general definitions with additional definitions for each warrant officer rank, WO1 through CW5.

- On 11 January 2008, the Assistant Secretary of the Army for Manpower and Reserve Affairs issued a memorandum authorizing 30 years of active service for all Regular Army warrant officers of any grade. Previously, only Regular Army CW5s were allowed 30 years of active warrant officer service.
- On 26 April 2010, the NDAA for Fiscal Year 2011 was introduced in the United States House of Representatives. Section 507 of the bill amended Section 571(b) of Title 10 USC, to provide that appointments in the rank of regular warrant officer—WO1—be made by the regulation issued by the secretary of the military department and that these appointments shall be made by the President, except that appointments in that grade in the Coast Guard shall be made by the secretary concerned. The bill was pending in Congress as of September 2010.
- As of 30 September 2010, the Army warrant officer cohort will be composed of about 24,550 men and women, as follows:
  - Active Army—62 percent
  - Army National Guard—32 percent
  - Army Reserve—12 percent (not counting members of the Individual Ready Reserve also available for mobilization)
  - Technical branch warrant officers—65.4 percent
  - Aviation warrant officers—34.6 percent
  - Percentage of the Army—2 percent
  - Percentage of the Officer Corps—14 percent
  - Branches with warrant officers assigned—17
  - Number of warrant officer MOSs—approximately 70

The above information is extracted from the online warrant officer history maintained and frequently updated by the nonprofit Warrant Officers Heritage Foundation. A more detailed history can be found on the foundation's website at <*www.usawoa.org/WOHERITAGE*>. Click on "Warrant Officer History." The online history contains many pictures, links to copies of original documents, and information about warrant officers with historical significance.

Chief Warrant Officer Five Welsh (Retired) served in the United States Army Reserve and on active duty that culminated in his assignment as the Army Reserve warrant officer policy integrator in the Office of the Chief, Army Reserve, in the Pentagon. He retired from active duty in 1998 with 42 years of combined Reserve Component and Active Army service. He was National President of the United States Army Warrant Officers Association from 1988 to 1992 and was a member of its full-time staff from 1998 to 2003. He founded the Warrant Officers Heritage Foundation in 2003 and currently serves as president and member of the board of directors.

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eptember-December 2010

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ENGINEER

The Professional Bulletin of Army Engineers

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Front cover: During Operation Unified Response at Port-au-Prince, Haiti, divers from the 544th Engineer Dive Team drill holes for emplacing rebar to reinforce a damaged pile. (See article on page 7.) (U.S. Navy photo)

Back cover: U.S. Army photos

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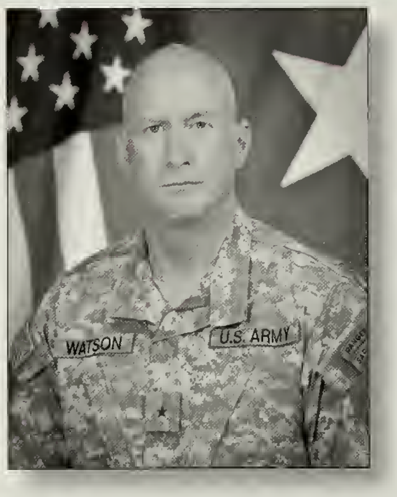
Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School



I am simply awed by the daily accomplishments of this Regiment of Engineers…the way our Soldiers serve our Army and Nation from the front and by their example. From our combat engineers clearing routes throughout Afghanistan; to our construction engineers cutting new roads, erecting bridges, and building force bed-down facilities; to our geospatial engineers ensuring that leaders from platoon- to theater-level can visualize the operating environment with the most current data. You support the fight with relentless resolve every day, understanding that the stakes are high; you never falter to accomplish what is asked. Never has there been a more exciting time to be an Army engineer, and never has the demand for engineer warriors been greater. Frankly, it is humbling to be a leader among such incredible engineer Soldiers—all of you sappers at heart!

But I've always felt that we, at Fort Leonard Wood, could do more to directly support our units that are preparing for combat and also to learn from your experience and rapidly integrate those lessons into our doctrine and leader development. This was confirmed during the last ENFORCE when our senior commanders and command sergeants major asked that we modify our Regimental Campaign Plan to include a line of effort specifically focused on "Support to Current Operations." During our recent Regimental Commander's Council, held at the Devil's Lake Regional Training Center in North Dakota, senior leaders approved our modification to the Regimental Campaign Plan to better support current operations. One of the major areas that commanders suggested we target for immediate improvement was our collection of unit lessons learned and rapid integration of those lessons into our training and leader development (Campaign Plan Decisive Point [DP] 3-10). Following is an update on this critical effort, along with a discussion of how you can do your part as members of this profession.

The Problem. In the past, unit training at our Combat Training Centers (CTCs)—predominantly by Active Army units—was the center of gravity for collecting lessons learned. The Combined Arms Lessons Learned (CALL) Office at Fort Leavenworth was the central repository and engine of change to our doctrine and leader development. CTC observer/trainers were highly sought to be instructors at our schools—and were managed that way.

Today, that is no longer the case…in fact, it hasn't been the case for 9 years! The most fertile and relevant ground for collecting lessons learned is the battlefields of Iraq and Afghanistan—albeit balanced by CTC experiences as we explore the challenges of full spectrum operations that we will face in the future. Units that recently return from combat are the new center of gravity of a learning and adaptive Army. And the former central clearing for lessons learned that would shape future doctrine, force design, and leader development has given way to a dispersed network of learning. Some examples of the new learning network are warfighting forums; assessment teams that deploy to visit units in the fight; unit post deployment after action reviews (AARs) conducted by Active Army, United States Army Reserve, and Army National Guard units; SIPR and NIPR websites; and blogs. In many cases, it is the students who recently returned from the fight who bring the most relevant instruction to our officer/warrant officer/noncommissioned officer (NCO) professional development education.

What We Must Do. This new network of learning, the bottom-up nature of relevant lessons, and the need to rapidly turn those lessons into adaptive action with the speed and urgency of war, demand that we completely "rewire" our processes within the Regimental Headquarters to better serve our profession. Here are the steps we have taken within our Regimental Headquarters:

- I've charged the Director of Training and Leader Development (DOTLD) with mission command for the "Support Current Operations" line of effort to put a single organization in charge of monitoring and orchestrating the learning network, align lessons learned with rapidly modifying doctrine and leader development, and give broad authority to alter professional military education (PME) course instruction based on lessons learned so that yesterday's combat experience is taught in tomorrow's classroom.
- We've increased the capacity of our Training Integration Office (TIO) to become the hub of adaptive education. Their job is to connect with field units, generate assessment teams, attend unit postdeployment AARs, collect the lessons learned in coordination with

Maneuver Support Center of Excellence efforts and CALL, and pass off the most relevant lessons to the Director of Instruction for integration into the classroom.

- I've moved the Counter Explosive Hazards Center (CEHC) under DOTLD so that we can begin to institutionalize counter-improvised explosive device (C-IED) training into all facets of our PME and leverage CEHC's ability to track the latest enemy and friendly tactics, techniques, and procedures (TTP) in order to keep C-IED training highly relevant to the current fight.
- I've shifted the main effort of our education Quality Assurance Element (QAE) toward ensuring that classroom instruction remains relevant and incorporates the latest lessons learned from units.
- I've established a nominative program for the selection of instructors to ensure that we have the right leaders—with the most recent combat experience—training and educating the next generation of engineers with the added incentive that their follow-on assignment will be closely managed.

What Has Been Accomplished. These past few months, we have made significant gains in putting the programs in place to achieve the objectives set by field commanders in DP 3-1. CEHC is now under DOTLD, and integration of C-IED training into all aspects of officer, warrant officer, and NCO education is well underway. DOTLD has participated in the postdeployment AARs of the 372d Engineer Brigade, 412th Engineer Command, and 203d Engineer Battalion. We covered down on the full spectrum operations rotation of 3d Brigade Combat Team, 82d Airborne Division, and focused on fire support officer (FSO) lessons for the 46th Engineer Battalion. We also deployed an assessment team to Afghanistan in September to collect observations from units in the fight; the Initial Impression Report can be downloaded at <*https://call2.army.mil/toc.aspx?document=6462*>. Finally, we have begun a comprehensive relook at the program of instruction for our NCOs attending the Advanced Leader Course (ALC) and Senior Leader Course (SLC), as well as our young officers attending the Captains Career Course, to ensure that the training and education we provide is consistent with combat observations, reflects the contemporary operating environment, and challenges the student to think adaptively. I'm pleased with the progress we are making, but we are far from being finished.

How You Can Help. If you are truly a member of this profession, you will agree that we have to do a better job of being a learning and adapting organization. And if you are truly a member of this profession…if you love this Regiment…you want to know how you can help achieve this vision. It's simple:

- Actively participate in the various forums where we discuss observations and lessons learned; help us understand where we need to improve our doctrine, organization, training, materiel, and leader development for the next fight.
- Give us visibility of your unit's postdeployment AAR session and report; demand that someone from the Regimental Headquarters attend.
- Take us up on the invitation to be part of critical task selection boards or course content reviews so we can ensure that what we are teaching tomorrow's leaders is relevant and current and that it produces the leaders you need to win.
- Encourage your best and brightest leaders to come to the Engineer School as instructors for our next generation of officers, warrant officers, and NCOs; nominate them so we can manage their assignment to Fort Leonard Wood and their follow-on assignment. One instructor touches hundreds of future leaders each year; only our best should be given that responsibility.

In the next "Clear the Way" article, I hope to report on progress that we are making on another vitally important decisive point of the Regimental Campaign Plan—DP 3-12: "Execute Functional Training for ARFORGEN"—which will establish a forum and process for commanders to tell us what specific training you need to prepare for your mission, when you need it, and how we can provide the necessary expertise at key events like mission rehearsal exercises (MRXs).

Lead to Serve. Essayons!

Army Values

Loyalty
Duty
Respect
Selfless Service
Honor
Integrity
Personal Courage

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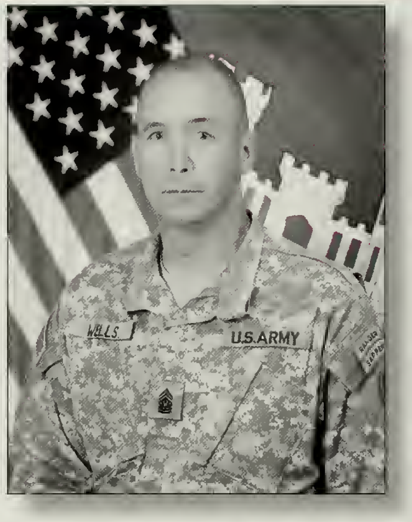
Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School

Building the Combat Outpost
Principles of Patrolling
^
Construction



Thousands of years ago, a leader on some distant battlefield yelled in frustration, *"Somebody better figure out how to bust into this fortress, or I swear to the gods that heads will roll!"* And while everyone near the leader felt the fear crawl up to their soon-to-be-severed necks, two young Soldiers look at each other knowingly, and with a slight nod to each other stepped forward and yelled, *"Sire, Let Us Try!"* And so began the field of military engineering…or something like that. That leader came to the realization that his Army needed Soldiers with the cunning and imagination combined with brute force and "ignoance" to defeat the machines of war. Whether it was breaching into a heavily fortified position or designing a fortress built to repel invaders, our roots to the military engineering profession have always been focused on figuring out how to either build something or how to blow it up. Not a lot has changed since those early years. The following is an attempt to imagine the thought process of yesterday's engineer and apply it to today's engineering using the principles of patrolling (Planning, Reconnaissance, Security, Control, and Common Sense) in building today's version of the castle—the combat outpost (COP).

Planning. I think it was a person named Murphy who said that no plan survives first contact with the enemy. Well, Mr. Murphy, you must be a civilian, because that's why we have leaders in our formation. Our leaders and their staff develop a plan and disseminate the information to all their Soldiers so that they act as one unit. Everything in the plan must support the commander's vision of where to array platforms, like COPs, to project combat power in the most efficient manner. It takes an engineer with imagination to visualize the battlefield and identify areas that best support offense, defense, and stability operations. Our geospatial engineers give us an excellent view of the battlefield with most of the data we need to give the commander several options when deciding where, and when, to build a COP. But it still takes someone to get out on the ground and verify the terrain to the commander's plan.

Reconnaissance. A good recon verifies the design and layout and allows the engineer to make modifications that will best support the commander's plan for a COP. Today's recon not only verifies the physical terrain but also verifies the human dimension of the battlefield. Are we building a COP that straddles tribal boundaries? Are we building in a flood plain or a previously mined area? In addition to observation, cover and concealment, obstacles, key terrain, and avenues of approach (OCOKA), we have to consider area, structure, capabilities, organizations, people, and events (ASCOPE) when conducting a recon (see Field Manual 3-24, *Counterinsurgency*, Appendix B). Then it's time to move out and start building, once we've verified the plan.

Security. Pretty much self-explanatory, but it has huge implications for our maneuver brothers and sisters. Every consideration must be taken into account, from moving ourselves to the proposed COP in a secure manner, to the design and construction of the COP that will provide the best protection for its inhabitants. I personally think the most dangerous part of any mission is just getting to the objective. What are the engagement criteria (rules of engagement [ROE]) while moving to the objective? Are our battle drills detailed enough and rehearsed so that our unit can respond quickly to a fluid situation? What are the disengagement criteria? And once we get to the COP, what measures do we need to take to secure ourselves while we're constructing the COP? What is the main threat to the Soldiers at the COP? Better yet, out of the seven forms of contact, which ones are most likely to be used by the enemy? Do we use sniper screens? What about the entry control point? The whole idea behind a COP is that it's a secure place close to the civilian population that our maneuver brothers can use to launch continuous, 24-hour counterinsurgency (COIN) operations without having to go all the way back to a base camp to reset. It's a castle in the countryside that demonstrates to the people that the government cares about its citizens and is willing to provide a secure and productive environment that will improve the quality of life. The castle was the precursor of today's cities. A thousand years ago, people lived near the castle to either work on the construction of the castle or provide supplies to its inhabitants. It provided a secure area that fostered trade.

(Continued on page 33)

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer

I recently had an opportunity to attend the annual Maneuver Support Center of Excellence (MSCoE) Retention Awards Ceremony at the Pershing Community Center here on Fort Leonard Wood. What a great event! Many outstanding recruiters and career counselors were recognized for an array of accomplishments, including the Career Counselor and Retention Noncommissioned Officer (NCO) of the Year awards. As I looked around the room, I noticed that I was the only warrant officer in attendance. Now I must admit that being the only warrant officer at an event is not uncommon; however, being the only one at a retention awards ceremony got the rusty wheels spinning in my head. What is the role of the Army warrant officer in the Commander's Retention Program? Is there one? Or do we leave that to the NCOs and officers to handle once we pin on the warrant officer rank?

The more I thought about these questions, the more convinced I became that warrant officers can and should play a huge role in the Commander's Retention Program. Many warrant officers were career counselors or recruiters as NCOs and certainly have retained the skills necessary to speak with and mentor young engineer Soldiers and NCOs on the virtues of staying in the Army. The good news is that warrant officers are playing an important—although often a supporting—role in the success of the program. On a personal note, I reenlisted for six years back in 1986, largely due to the influence of a "Quiet Professional," CW4 Marvin Humble.

For those of you serving as "Quiet Professionals," keep up the good work. If you are not involved in the Commander's Retention Program, get involved. Talk with your Soldiers about their career plans—not just once, but many times—over a period of time. Nothing says you care for Soldiers' well-being more than giving your time to them. The retention rates across the Army are excellent, and here at Fort Leonard Wood, retention rates for all the major commands were more than 100 percent for the past fiscal year.

What's ahead? The Army has lowered this year's retention goals, and some Soldiers may not have the opportunity to reenlist. Be part of the process, and help identify quality and technically competent Solders to continue to serve in this great Army and Regiment. To quote Major General David Quantock, MSCoE and Fort Leonard Wood commanding general, "It is always about quality, and never about numbers." Do your part to discover the quality Soldier the commanding general refers to and the Army needs.

On another note, engineer warrant officers continue to do great things across our Regiment. There's a great article in the May–August 2010 *Engineer Professional Bulletin* titled "The Theater Engineer Construction Battalion: General Engineering in Support of the Warfighter" by LTC Adam S. Roth, outlining the recent deployment of his unit as the theater construction battalion in Iraq. I was struck by the positive comments made by LTC Roth on the outstanding performance of his three construction warrant officers. The roles they played in the construction effort certainly contributed to the success of the task force. This is huge, since the integration of Construction Engineering Technicians into vertical platoons is still in its infancy in some units. The success or failure of the engineer warrant officer program is in your hands. Keep up the great work.

I'd also like to report an example of community service by engineer warrant officers. Recently, CW2 Ryan Ward and members of the 120A Warrant Officer Basic Course 02-10 traveled on their own time to Jefferson City, the Missouri state capital and site of the Missouri Veteran's Memorial, to provide some extra care to the state-maintained memorial as the class's community project.

There are literally hundreds of stories like this across our Army and Regiment. Thank you—you are making a difference!

Finally, just as the Army's retention program is about quality versus quantity, so too is the Regiment's warrant officer accessions mission. We are looking for outstanding NCOs who possess a sustained and demonstrated level of technical and leadership competency as supported by rater and senior rater comments on Noncommissioned Officer Evaluation Reports (NCOERs). For more information about how to become an engineer warrant officer, log on to the Army recruiting website at *<http://www.usarec.army.mil/hq/warrant>*.

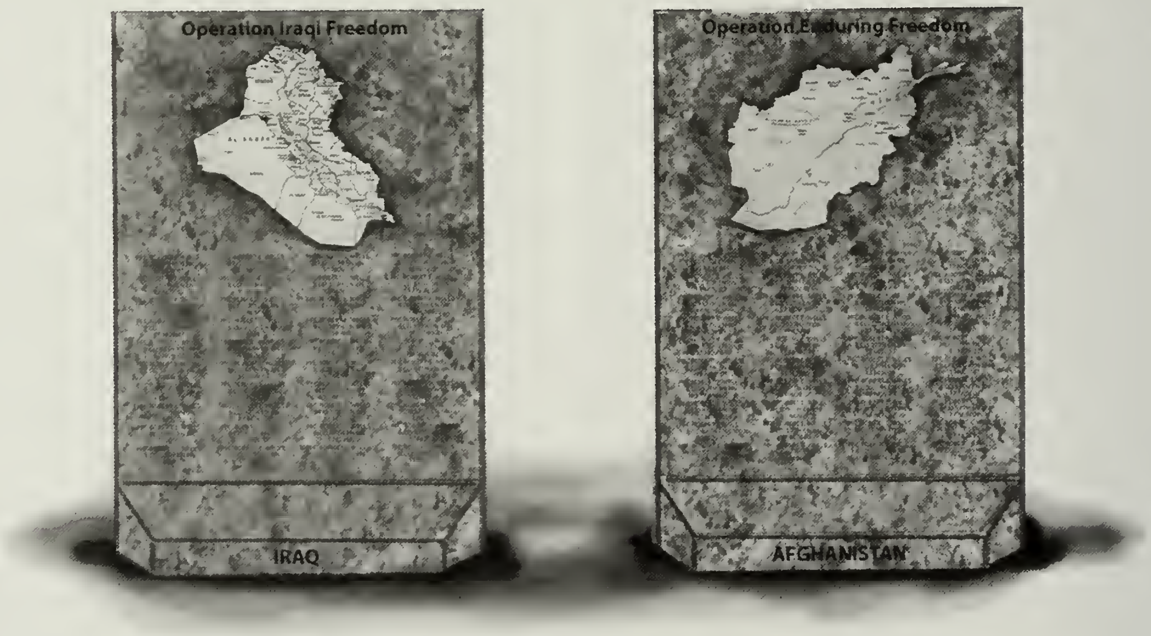
Until next time, stay safe. Essayons!

Dedication

The following members of the Engineer Regiment have been lost in overseas contingency operations since the last issue of *Engineer*, or their names were inadvertently omitted from a previous list. We dedicate this issue to them.

Clark, Private First Class Ryane G.	57th Engineer Company, 27th Engineer Battalion, 176th Engineer Brigade	Fort Bragg, North Carolina
Jenkins, Specialist Gerald R.	Company A, 1st Brigade Special Troops Battalion, 1st Brigade Combat Team	Fort Campbell, Kentucky
Maldonado, Specialist Alexis V.	510th Clearance Company, 20th Engineer Battalion, 36th Engineer Brigade	Fort Hood, Texas
Morrison, Specialist Donald S.	584th Mobility Augmentation Company, 20th Engineer Battalion, 36th Engineer Brigade	Fort Hood, Texas
Pallares, Specialist Ronnie J.	57th Engineer Company, 27th Engineer Battalion, 176th Engineer	Fort Bragg, North Carolina
Simpson, Sergeant Mark A.	584th Mobility Augmentation Company, 20th Engineer Battalion, 36th Engineer Brigade	Fort Hood, Texas

Proposed Fallen Engineers Memorial



One of the highest priorities of the Army Engineer Association (AEA) is to recognize all Army engineers who have given their lives in the defense of the United States of America. Equally important is to recognize those engineers who received wounds in combat resulting in the award of the Purple Heart. AEA is accepting donations to support the design and construction of a Memorial Wall for Fallen Engineers to be located in the "Sapper Grove" at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment. To learn more, go to <*http://www.armyengineer.com/memorial_wall.html*>.

ARMY ENGINEER DIVERS:

FIRST IN PORT-AU-PRINCE HARBOR

U.S. Navy photo

By Captain Scott Sann, Captain Jerry M. Hallman, and Dr. David J. Ulbrich

A massive earthquake measuring 7.0 on the moment magnitude scale shook Port-au-Prince in Haiti on 12 January 2010. Physical damage and loss of life reached cataclysmic proportions, with at least 200,000 Haitians dead, 250,000 injured, 500,000 homeless, and 300,000 buildings destroyed or condemned. The quake also closed Baie de Port-au-Prince and ruined its main pier and quay, leaving large sections submerged or damaged and severely degrading the ability to offload desperately needed supplies (Figure 1, page 8).

On the same day, the United States Army 544th Engineer Dive Team was aboard the auxiliary rescue and salvage United States Naval Ship (USNS) *Grasp* (T-ARS-51) on a training exercise with Belizean and Guatemalan forces in South America. Shortly after the quake hit, United States Southern Command (SOUTHCOM) diverted the USNS *Grasp* and the 544th to Port-au-Prince. Once there, the Army divers' tasks were to assess the damage to harbor facilities and then attempt to reopen the port for incoming humanitarian relief. The 544th was the first dive element to arrive on the scene in Operation Unified Response—the U.S. military's response to the earthquake. The unit came under the control of Combined Task Group 42.1, as part of Joint Task Force Haiti. This article tells the Army engineer divers' story from 18 January to 31 March, and it analyzes the lessons learned from what would become one of the most ambitious dive operations in recent Army history.

In addition to helping assure mobility of troops and equipment, and according to Field Manual 3-34.280, *Engineer Diving Operations*, "Engineers provide support to general engineering operations in and around the water." To accomplish the latter mission in Haiti, 544th divers performed many key tasks subsequently listed in the manual: hydrographic surveying, planning, inspecting, clearing, repairing, constructing, rehabilitating, and opening ports.

Phases of Operation

Efforts of the 544th could be divided into three distinct phases during 10 weeks of Operation Unified Response. Phase I entailed making assessments of damage to several harbor facilities. Phase II included more complex assessments, as well as preparing the pier for rehabilitation, delegating tasks, and creating timelines. In Phase III, the Army divers worked jointly with United States Navy elements to repair the pier's piles and thus rehabilitate the pier. Throughout all three phases, Army divers used a wide spectrum of surveying, salvage, and construction capabilities, while Navy divers brought specific knowledge about particular aspects of salvage and construction operations. The Army divers initially worked with the Navy's Mobile Diving and Salvage Unit 2 (MDSU 2) and later with the Navy's Underwater Construction Team 1 (UCT 1).

Phase I: Level I Assessment (18 to 23 January)

After taking on extra supplies at Guantanamo Bay on 15 January, the USNS *Grasp* debarked for Port-au-Prince, arriving on the morning of 18 January. Everyone in the 544th realized the seriousness of the situation after seeing a Haitian corpse floating in the ocean about 10 miles from

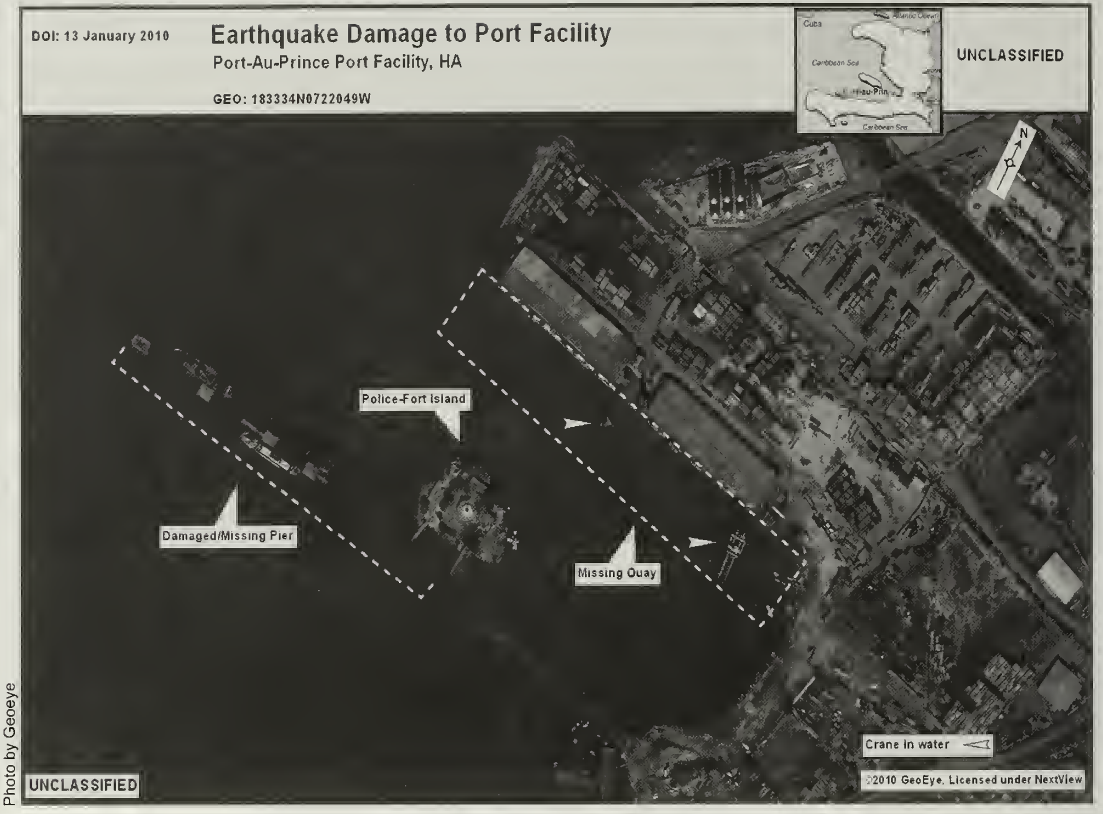


Photo by Geoeye

Figure 1. Satellite image of Haiti's Port-au-Prince harbor

the harbor. It was then that Army divers realized they were the first responders to this natural disaster.

Once anchored in the harbor, the 544th found no existing infrastructure and no command and control (C2) node. Without waiting for C2 to be established, the divers started conducting triage-style Level 1 Assessments of all affected port facilities. They made visual inspections and photographed the north quay wall and the south pier. They logged several hours of "bottom time"—time from when a diver leaves the surface of the water until he begins ascent back to the surface. Their inspections of the piles and bents supporting the southern pier revealed extensive damage. Concurrently with the Level 1 Assessment, they made hydrographic surveys to determine the harbor's contour lines of depth (using sonar) and location (using the Global Positioning System [GPS]).

MDSU 2 divers worked to locate submerged hazards north of the pier. Thereafter, the Navy's fleet survey team marked off clear channels with buoys to aid that landing craft, utility/landing craft mechanized (LCU/LCM) in offloading of supplies—albeit in relatively small amounts—directly onto the beach as part of joint logistics over-the-shore (JLOTS) operations.

The 544th divers submitted their Level 1 Assessment to the Naval Facilities Engineering Command (NAVFAC) engineer for analysis and guidance regarding subsequent activities. The 50-foot-wide by 1,000-foot-long north quay wall was damaged beyond repair, because so much of that wall crumbled or collapsed into the water. Although a 400-foot-long span of the south pier completely disintegrated during the earthquake without possibility of reconstruction, the south pier's 800-foot span remained standing and could be rehabilitated. No substantive repairs, however, could begin until salvage equipment and an underwater hydraulic tool package arrived from the 544th's home post of Fort Eustis, Virginia.

Early in the morning of 20 January, the first of several setbacks occurred when a 6.1 tremor hit Port-au-Prince. This caused divers to postpone repairs to the southern pier until the aftershock's effects were known. The NAVFAC engineer and the divers conducted a reassessment and found that the tremor caused no significant damage. Meanwhile, UCT 1 helped coordinate reception, staging, onward movement, and integration (RSOI) because additional equipment and personnel arrived in the harbor every day.

Phase II: Level 2 Assessment and Preparations (24 to 30 January)

On 24 January, the completion of Combined Task Group 42.1's laydown area in the Port-au-Prince main terminal established a C2 node for the entire operation. Beginning that same day, Army divers made a Level 2 Assessment, which more comprehensively surveyed the structural integrity of the pier. They also consulted with the NAVFAC engineers on how best to strengthen the 800 feet of the south pier still above water. No less than 39 bents (each with 6 piles) needed either minor repairs or complete replacement. The pier was supported by several dozen bents reaching along the length of the pier to the harbor floor.

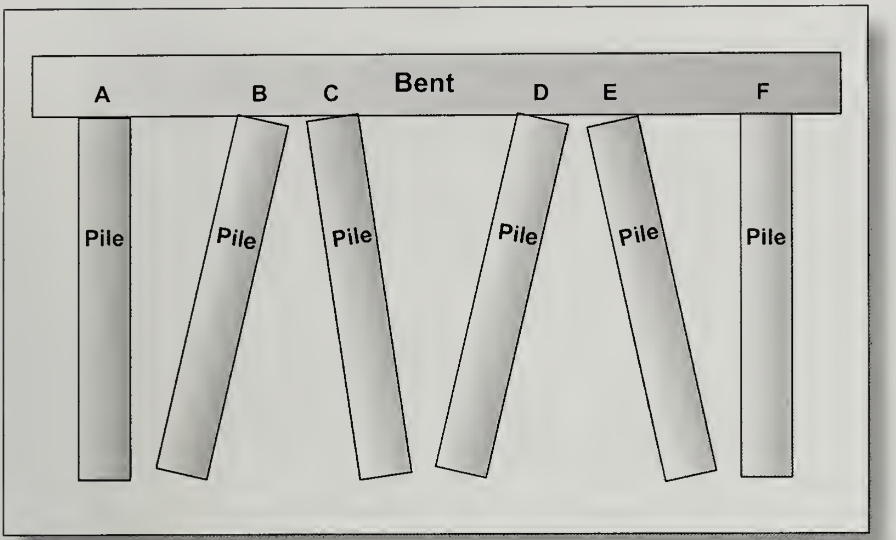


Figure 2. Diagram of bent/piles before earthquake

Each of these bents consisted of 6 piles in a row across the width of the pier. The 2 outermost piles stood vertically at 90-degree angles, while the 4 inner piles alternated at steep angles (Figure 2).

Throughout Phase II, divers from UCT 1 and the 544th painted marks on the top side of the south pier, identifying the degree of damage and the corresponding repairs. The Army divers then used hammers and chisels to clear marine life and loose materials from the south pier's piles. Though tedious, cleaning all 234 piles (of the 39 bents) took several divers only 2 or 3 days. The preparatory work would ensure that pile caps could be added quickly when the Phase III started.

On many days, the divers encountered a serious problem—poor visibility, sometimes as low as 2 feet—due to the debris and filth in the water. Limited visibility was one of several environmental challenges for the 544th, who experienced some of the worst imaginable diving conditions in Port-au-Prince harbor. Petroleum floated on top of the water, and numerous marine hazards like jellyfish, human waste, and debris floated beneath the surface. Adding to the perilous conditions, crews on Haitian tugboats routinely discharged their septic tanks into the harbor. Brown clouds of refuse could be seen moving from the tugboats under the pier to where the Army and Navy divers were working. Making the situation more dangerous, the high water temperatures caused heat casualties among the divers.

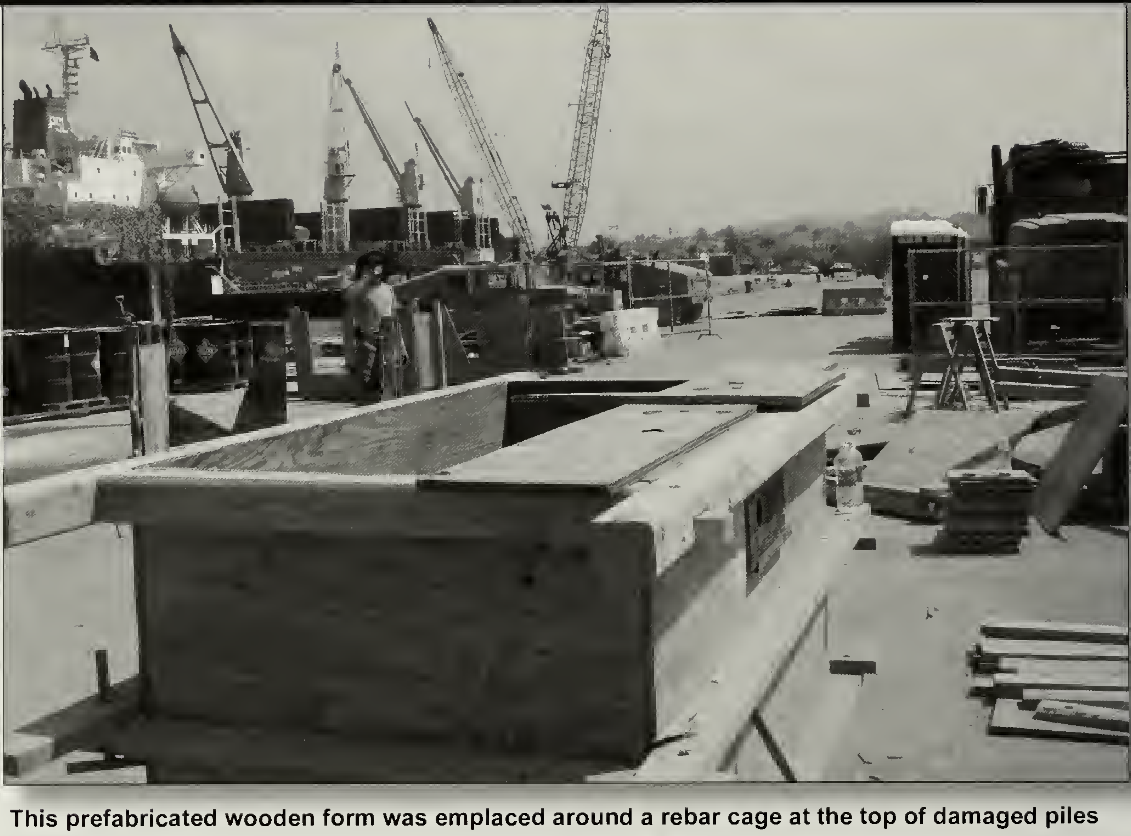
Phase III: Repairs and Rehabilitation (31 January and 27 March)

With the assessments and other shaping actions completed, the 544th spent part of 31 January resting and part of it determining the composition of dive teams, while prioritizing tasks to streamline work flow. Some piles retained partial structural contact with the pier above, and thus small gaps could be easily and quickly reinforced by filling them with grout spread by divers using hand trowels. However, most piles in most bents were sheared completely away from the pier above, requiring complete reconstruction to the upper portions of the piles (see photo below). Rehabilitation work on the south pier began on 1 February and lasted for the next 7 weeks. A multistep process developed over time, in which the 17 Army and 7 Navy divers worked together closely and effectively.

Once repairs began, divers of the 544th, wearing wet suits and masks, drilled about a dozen vertical holes for the 2 outermost vertical piles and another dozen diagonal holes for the 4 inner piles on each bent. They drilled holes for 3 bents (18 piles) per day, so the entire drilling operation took about 2 weeks. This exhausting task required 2 divers for each 45-pound hydraulic drill, alternating their drilling every few minutes into the pier above. Other divers in scuba gear remained nearby to retrieve any

U.S. Navy photo

Divers found many severely damaged piles like this one.



This prefabricated wooden form was emplaced around a rebar cage at the top of damaged piles to hold concrete until it cured. This created the pile caps reinforcing the structure.

dropped tools in the 20-foot-deep water, to assist if any accidents occurred, and to emplace friction clamps on which the divers stood while operating the drills.

Once holes were drilled, another set of divers injected epoxy into the holes and inserted 6-gauge rebar, which extended downward and overlapped with the tops of the piles below. Next, the divers wrapped 3-gauge rebar horizontally around the vertical rebar to create a cage that would give strength to the pile once the concrete was poured. This step was completed in a few minutes for each pile. Last, a prefabricated wooden form was emplaced around each cage on the piles, and concrete was pumped into the form. After 24 hours, the concrete had sufficiently cured, connecting the new pile to the cap above. The wooden form could then be removed and used again on other piles and bents. The process of pumping the concrete was by far the most time-consuming, because it required half a workday for each bent.

Meanwhile, divers operating the drills moved on to the next bents and began the incremental process again—as long as the equipment continued to function and the weather continued to be favorable. The 544th and UCT 1 divers continued drilling holes, emplacing rebar, attaching forms, pumping concrete, and removing forms for all the severely damaged bents. The last bent was completed on 24 March after about 7 weeks of work. At that time, NAVFAC engineers evaluated the structural strength of the south pier, and they determined its load capacity to be 500 pounds per square foot, as opposed to the pre-earthquake load capacity of 750 pounds per square foot. On 27 March, when the south pier was fully able to receive offloaded humanitarian supplies along its 800-foot span, the 544th Engineer Dive Team secured its equipment and departed for Fort Eustis.

Problems Faced—Solutions Found

As the 544th's situation report for 9 February states, "Good rhythm [was] established on the dive side between UCT and Army crews; pace should start picking up now that concrete form templates have been established. Pile preparation continues ahead of schedule." (See photo, page 11.) However, good rhythm was maintained only as long as equipment functioned, weather cooperated, and the logistical system kept pace. The realities of the operational environment in Port-au-Prince harbor stretched the capabilities of the 544th Engineer Dive Team, UCT 1, and the crew on the USNS *Grasp*.

With no infrastructure in Haiti, the 544th was left to maintain work timelines with only resources immediately onboard the USNS *Grasp* or what was transported in by the Army or Navy. The lag time for bringing supplies to Haiti stood as one of the most vexing challenges. To reduce bottlenecks, the 569th Engineer Dive Detachment Headquarters and the 6th Transportation Battalion S-4 at Fort Eustis allotted funds for unexpected expenses and tracked maintenance on equipment. The 569th and the 6th also shuttled supplies to Navy ports of debarkation and piggybacked on the Navy's logistics system. UCT 1 controlled the flow of resources through the Navy's tracking process and procurement path that ran from Florida, a shorter transit than from Fort Eustis.

The 544th and UCT 1 required a constant influx of replacement equipment, spare parts, and other materials because of failures and malfunctions in the harsh conditions of Port-au-Prince harbor. No doctrine had been written to outline how to maintain continuous dive operations in this austere environment. For instance, when one hydraulic drill broke down, its parts were cannibalized to keep another "Frankenstein" drill functioning. The 544th eventually used every hydraulic drill in the dive teams' inventories at Fort Eustis. Other equipment also failed from wear or damage and needed to be replaced. Malfunctions or breakdowns frequently interrupted the entire rehabilitation process. They required stopgap solutions on-site, or delays until new equipment or additional spare parts could be procured from Guantanamo Bay or the continental United States.

One of the stopgap solutions illustrated the flexibility and ingenuity of the 544th, UCT 1, and their support personnel. The hose filling the wooden forms with concrete-aggregate mixture clogged on 15 February—only its second day in use. The dried and caked aggregate in the hose needed to be chipped away by hand, causing an unacceptable single point of failure. Either this chipping would slow progress for hours each day, or procuring a new hose would take several more days, and the clogs might reoccur. Neither option was practical. As a way of reducing the number and severity of clogs, it was decided that no aggregate would be added to the concrete; therefore, the hose did not clog anymore. This solution, according to the NAVFAC engineer, actually strengthened the pour, which stood at 12,000 pounds per square inch for pure cement. The only downside to this solution was the subsequent requirement for more concrete to be ordered. Countless other on-site fixes demonstrated knowledge and expertise of the 544th, UCT 1, the NAVFAC engineers, and the carpenters and mechanics working in the staging area and on the USNS *Grasp*. They fabricated or cannibalized whatever was needed with material on hand until long-term solutions could be realized.

Apart from logistical challenges, numerous environmental problems frequently stalled progress. Every time it rained, the already filthy water became almost impossible to work in because refuse washed off the mainland into the harbor. Waste from tugboats and sewage from the mainland compounded ecological hazards. The only alternative for the Army and Navy divers came in initiating preventive measures—including constantly testing the water's toxicity, monitoring divers' vital statistics, and giving regular doses of antibiotics. No diver with an open wound was allowed in the water. Even with these precautions, one diver developed a rash and was sent to the hospital ship USNS *Comfort* for observation and treatment. Because these hazardous conditions made entering the water daily a mental challenge, the Army and Navy divers should be commended for making their dives without complaints, doing their duty, and completing the mission.

Lessons Learned

Many lessons can be learned from the dive activities in Operation Unified Response. First, equipment breakage or extreme wear slowed the 544th Engineer Dive Team's best efforts to rehabilitate the pier in Port-au-Prince harbor. In the future, Army dive units can avoid or minimize delays by maintaining severe redundancy of equipment and spare parts on the construction sites. In fact, having three or four extra pieces of "no-fail" equipment—the drills and the concrete-pumping equipment, in the case of Haiti—could be particularly critical to reducing lag times in waiting for fabrication, repair, or procurement.

Second, whereas dive-qualified Navy corpsmen served in MDSU 2 and UCT 1, the 544th's Army medic had neither completed the diving course at the Naval Diving Salvage and Training Center nor received certification as a dive medical technician (DMT). While competent in treatment techniques for land operations, that Army medic was not prepared for injuries or complications dealing with respiration or decompression that are unique to underwater operations. In these cases, the 544th needed to rely on the Navy's medical assets. The Soldiers in the 544th thus realized that an Army dive team should add a qualified DMT to its table of organization and equipment (TOE). This would make specialized medical treatment intrinsic to an Army dive team and thereby increase the autonomous functionality of the team.

Third, the experiences in Haiti taught the Soldiers in the 544th that no Army or Navy dive unit can do everything independently in such a complicated operation. To improve effectiveness, joint training exercises between Army divers at Fort Eustis and Navy divers at Norfolk, Virginia, should extend long after Dive School and entail as

U.S. Navy photo

Using a prefabricated wooden form, divers constructed pile caps to reinforce the connection between the piles and the pier.

wide a spectrum of operational scenarios as possible. Merchant Mariners should participate in these joint training exercises to facilitate better communication and coordination between divers and their shipboard support. Likewise, bureaucratic snags—such as the Navy divers not being authorized to use the Army's Extreme Light Dive System—should be resolved in home ports by thoroughly cross-training and completely cross-certifying divers. Consequently, each Service's divers would become more familiar with the other divers' capabilities, equipment, and command structures. These actions would pay dividends in the future when natural disasters occur or humanitarian operations are undertaken. Joint dive operations would never again need to start at the zero-square as they did in Haiti. Increasing joint training exercises is not a recommendation offered only by the authors of this article; one Navy officer from MDSU 2 expressed the same desire to start scheduling Army–Navy dive exercises.

Fourth, rehabilitating the pier in Haiti pointed to the significance of one of the Army divers' key missions. Personnel need to be able to execute port opening and harbor clearance. It matters little if their deployment is in a combat operation or a humanitarian operation; either way, Army divers must be able to give commanders accurate surveys of what is beneath the water's surface and make timely repairs to underwater structures. By maintaining proficiency in these mission-essential tasks, divers help assure mobility and enhance sustainment.

Last, from a rear-detachment commander's perspective, communication and coordination posed the greatest challenges. Communication was extremely difficult at times and was best achieved via e-mail. However, using e-mail created as much as a full day of lag time in sending and receiving messages. Coordinating shipment of goods to earthquake-ravaged Haiti proved no easy task because of the complete lack of logistical infrastructure there. The U.S. military has initiatives in the disaster-response arena that are being designed to pull talent from across the armed services. Ensuring that Army engineer divers are integrated into these initiatives will be a key to success in future disaster-response missions using their diving assets.

Conclusion

Despite many setbacks, the 544th Engineer Dive Team achieved its goal of rehabilitating the south pier in Port-au-Prince harbor and opening it for large vessels offloading great quantities of aid into Haiti. Each of the seventeen divers in the 544th logged at least 350 hours of bottom time over their 10-week deployment in Operation Unified Response. As tangible recognition for their efforts, the Soldiers received two Navy Commendation Medals, four Navy Achievement Medals, five Army Commendation Medals, and six Army Achievement Medals. Each member likewise received the Humanitarian Service Medal as part of Operation Unified Response.

Captain Sann commanded the 544th Engineer Dive Team from December 2009 until its return from Haiti in April 2010. He has completed the Marine Engineer Dive Officer Course, the Sapper Leader Course, Airborne School, Air Assault School, and the Engineer Captains Career course. He holds a bachelor's in integrative biology from the University of California in Berkeley.

Captain Hallman is the commanding officer of the 569th and 74th Engineer Dive Detachments at Joint Base Langley-Eustis, Virginia. He has completed the Primary Leadership Development Course, the Basic Noncommissioned Officer Course, Engineer Officer Basic Course, Engineer Captains Career Course, Czech and Slovak Basic Courses at the Defense Language Institute, Basic Diving Officer Course, Salvage Diver Course, Construction Demolition Diver Course, Instructor Training Course, and the Systems Approach to Training Course. He holds a bachelor's in business administration from Old Dominion University in Norfolk, Virginia, and a master's in geological engineering from the Missouri University of Science and Technology in Rolla, Missouri.

Dr. Ulbrich is a historian at the United States Army Engineer School (USAES), Fort Leonard Wood, Missouri. He received his doctorate in history at Temple University. Before assuming his duties at the Engineer School in 2009, Dr. Ulbrich served as codirector of the Cantigny First Division Oral History Project, which is Web-streamed by Ohio University at <http://media.library.ohiou.edu/cantigny/>.

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Acknowledgments

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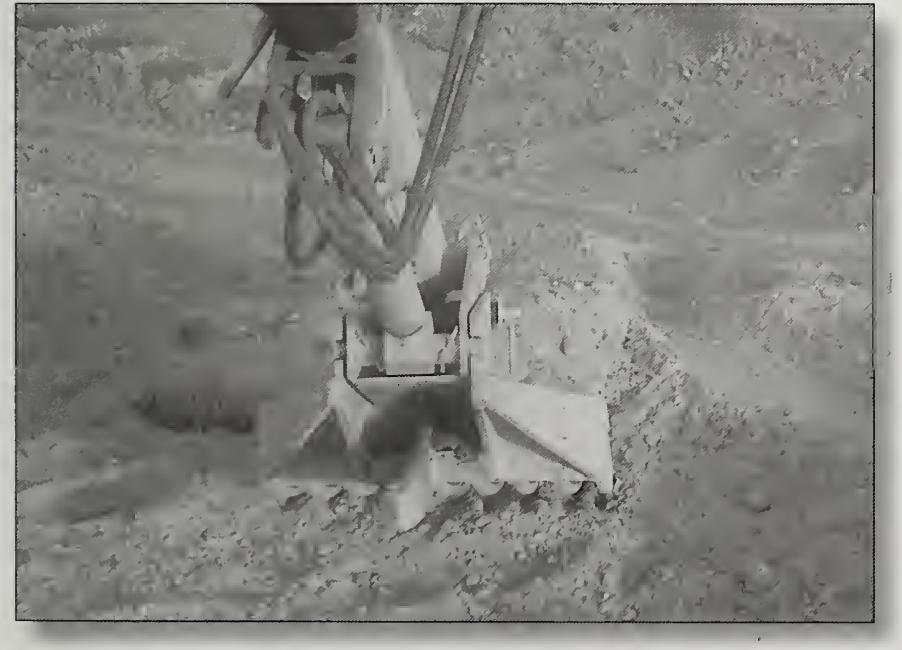
Strategizing the Counter-IED Fight in Anbar Province

By Lieutenant Colonel Todd M. Jacobus

Early in 2005, Iraq was preparing for the first of three elections. While Kurds in the north and Shiites in the south rejoiced at the opportunity to vote for the Iraqi National Assembly, the Sunnis of Anbar Province were not so positive. They saw this vote as the initial step toward their loss of influence. There was a robust insurgent presence in the province, estimated at 12,000 to 20,000 strong. They based their campaign against the coalition in the urban areas of Ramadi, Haditha, Anah, and Al Qaim, and there was a consistent increase in the number of U.S. forces killed by improvised explosive devices (IEDs).

After supporting the 1st Marine Division (MarDiv) and 11th Marine Expeditionary Unit (MEU) during the election in Najaf in January 2005, the 224th Engineer Battalion, Iowa Army National Guard, relocated to Ramadi to conduct a relief in place of the 2d Battalion, 11th Marine Regiment, accepting responsibility for five convoy security escort teams. Augmented with a United States Marine Corps company, the battalion's mission was to reduce the 70 percent success rate of IED attacks against coalition forces in Anbar. Route clearance, or mobility operations, would become the 224th's main effort throughout the deployment.



A Buffalo arm investigates an IED buried on the shoulder of a road.

The area of operation (AO) was about the size of North Carolina, including a 200-mile road network that stretched from the western outskirts of Baghdad to the eastern borders at Jordan and Syria and a dozen cities of significant size. Many of the cities had a strong insurgent presence. The 224th had also replaced the 153d Engineer Battalion and immediately began receiving additional route clearance equipment. The situation in Anbar had gotten significantly worse over the previous four months, and IEDs were without question the preferred weapon of Al Qaeda. Upon transfer of authority, the 224th had only one route clearance team, headquartered in Habbaniyah, to counter the IED fight. But within six weeks, the unit had fielded two "visual" teams (which operated in rural areas) and two "mechanical" teams (which operated in urban areas).

Using Engineer Resources

While there was a 400 percent increase in engineer equipment in Anbar between 2004 and 2005, there was an even more urgent and persistent need for these precious resources throughout Anbar Province during the deployment of the 224th. Initially, engineer resources were pushed to locations where IEDs were found more frequently. While this strategy allowed commanders who had suffered recent attacks to verify that routes in their areas of responsibility (AORs) were cleared, it was a reactionary strategy. It was the responsibility of engineers to design and recommend a strategy that would make the best use of their limited resources and capitalize on their capabilities. The battalion's intelligence officer was an industrial engineer who managed a paper company in civilian life.[1] He considered the enemy's tactics, analyzed the impact they had on coalition forces, and implemented a strategy based on his civilian Lean Six Sigma® training. He pulled from Multinational Corps–Iraq and 2d MarDiv databases all IED-related activities in the Multinational Forces–West (MNF–W) AO for analysis with the division and II Marine Expeditionary Force (MEF) staffs. The aim was to determine where the enemy was having the most success with IEDs—which routes had the largest quantity, the most density, and the highest success rate against U.S. personnel and destroying U.S. equipment.

Route analysis of MNF–W provided the five most dangerous routes in Anbar Province:

- Alternate Supply Route (ASR) Michigan *(Ramadi to Abu Ghurayb)*
- Main Supply Route (MSR) Mobile *(Ramadi to Ar Rutbah)*
- MSR Mobile *(Ramadi to Abu Ghurayb)*
- ASR Tin *(Haditha to Al Qaim)*
- ASR Uranium–MSR Mobile *(Ramadi to Haditha)*

While it was important to maintain open lines of communication by clearing MSRs and ASRs, it was equally important in the fight against Al Qaeda to provide freedom of maneuver throughout MNF–W. Analysis of the same data determined which city had the most IEDs and land mines, which city had the highest density of IEDs and land mines, which city had the lowest IED "find" rate, and which city had the highest rate of insurgency success against U.S. forces and equipment through the use of IEDs and land mines. The answers to these questions led to recommendations to the 2d MarDiv on urban route clearance support. Not surprisingly, the most dangerous urban areas were Al Qaim, Ramadi, Fallujah, Haditha, and Hit. After identifying these hot spots, the same data helped determine where to focus U.S. engineer resources.

Anbar Province AORs

While route clearance recommendations were made to the 2d MarDiv operations, plans, and training (G-3) staff, the brigade and regimental command teams in MNF–W also requested 224th route clearance resources—known as Task Force Ironhawk—through the division G-3. The 2d MarDiv operated with three maneuver brigades, including the 2d Brigade Combat Team, 2d Infantry Division (Ramadi–AO Topeka); Regimental Combat Team 2 (Al Asad–AO Denver), and Regimental Combat Team 8 (Fallujah–AO Raleigh). In addition, the 155th Brigade Combat Team, Mississippi Army National Guard, attached to the II MEF, also was allowed to request Task

A "mechanical" route clearance team operates on MSR Mobile in Anbar Province.

A 224th Engineer Battalion officer gives a briefing at Fort Hood in 2004.

Force Ironhawk support throughout the MEF. Commanders of all these units asked for engineer support with great frequency. The 2d MarDiv commanding general made the final approval on who received which resources.

Urban Route Clearance in Ramadi

The fight inside the city of Ramadi (AO Topeka) was the 2d MarDiv's main effort and included the most intense insurgent activity in the province. Al Qaeda blended in with the local population and enjoyed freedom of maneuver throughout the city, resulting in the most challenging urban route clearance fight in recent history. While Task Force Ironhawk consistently operated in a number of cities, it had at least one route clearance team supporting AO Topeka at all times. As with Anbar Province as a whole, data on IED strikes were analyzed; it was determined whether routes would best be cleared by mechanical or visual means; and recommendations were made to the brigade on which routes should be cleared. The maneuver commanders could weigh in with their mission requirements that needed route clearance support, and sometimes their needs resulted in a change of mission for route clearance teams. All areas of the city were dangerous, but certain routes—such as the main thoroughfare across the city and several routes in central Ramadi—were covered routinely. As a rule, leaders tried to lock in plans several days in advance in order to provide plenty of time for preparations.

A major problem was that with a population of approximately 500,000, Ramadi was a perfect destination for insurgents who were fortunate enough to get out of Fallujah alive. It was quite easy for them to blend in with the local population and continue their fight against the coalition through irregular warfare. Due to violence in the area, many factories closed, including the glass factory that was the largest employer in the province. As a result, the unemployment rate skyrocketed, and many young men were looking for ways to support their families. In 2005, members of Al Qaeda could maneuver throughout the city virtually at their discretion. Along with this freedom of maneuver came the opportunity to threaten, coerce, and influence the local populace and to emplace complex subsurface IEDs, with devastating effects.

The tactical fight in Ramadi lacked the continuous kinetic nature that resulted in the demise of thousands of insurgents in Fallujah; this was a battle against an enemy with no face. U.S. combat engineers cleared the same routes each night to open up the lines of communication throughout the city in order to allow freedom of maneuver to Soldiers and Marines of the 2d BCT. This urban route clearance effort was incredibly frustrating for the engineers, since frequently they would clear a route and remove an IED, then proof the route a few hours later, only to find another IED in the same hole. While it was frustrating work, it was also necessary work; if the insurgents had the will to emplace IEDs, then the engineers needed to match that will with the effort to quickly locate and remove them. U.S. combat engineers performed magnificently at this task.

Evolution of IED Initiation Systems

Technology played a significant role in the counter-improvised explosive device (C-IED) fight, and the division and battalion information management resources were integrally involved in the incorporation of frequency technology into the tactical fight. Initially, insurgents in Ramadi used command-detonated initiation systems, which used signals from key fobs, garage door openers, toy remote-control units, and two-way radios. Engineers counteracted this signal using IED countermeasure equipment that jammed the signals intended to detonate the device. As U.S. forces became more proficient at locating

IEDs and preventing their detonation, the insurgents transitioned to using long-range cordless telephones, which had a much more powerful signal, to initiate detonations. U.S. forces countered by using a stronger jamming signal. The C-IED fight escalated and the insurgents transitioned to using pressure-activated and passive/active infrared initiating systems, which are as easily activated by innocent civilians as they are by coalition forces. This tactic began to telegraph to the local population the "win by all means, at all costs" philosophy of Al Qaeda, who explain away the injury and death of innocent civilians as "the will of God."

Going After the Emplacer

Targeting the IED itself was not resolving the bigger problem. To truly engage the problem at a higher level, it was necessary to get inside the decision-making process of the individuals who emplaced the IEDs. Specifically, answers were needed to three questions:

- Where was the enemy?
- When would he be there?
- How could he be attacked?

Information from an existing database helped to locate the enemy and plot his locations on a map by using commercial off-the-shelf (COTS) software. It was a bit more challenging to determine when he would be at each location. Using another COTS system, the amount of time between attacks and finds at each location was calculated. The IED emplacers had a system: they located a place and time when they could safely drop off the components and set up an IED. Once the IED detonated, they would go back and reseed the same general location with another IED at the same time of day. Once the location and reseed time were identified, it could be determined which areas were likely to be reseeded soon. This became part of the battalion's information exchange with the maneuver commanders, who in turn pushed this data out to their respective task forces as actionable intelligence against which they could direct combat power. This engineer effort allowed the commanders to implement their skills and military art in taking out the IED emplacers, a mission that was accomplished with great success across Anbar Province—particularly in Ramadi—as 2005 progressed. Engineers who followed in the route clearance effort, including the 54th and 321st Engineer Battalions, built on this effort.

The enemy in Anbar Province was influenced by human nature, which meant that he found and frequented favorite spots to emplace IEDs. While some of these spots merited continuous clearance operations, others did not. The 244th had a tool to help it focus on where the enemy would be and when he would be there. Human nature led him back to locations where he'd had success, until he was either interdicted (which we controlled) or until he changed his mind (which he controlled). For an enemy that was hard to see, we had an opportunity to meet him by following him to his favorite locations, watching his patterns through collected data, and calculating when we would have our meeting. The C-IED fight was challenging, dangerous, and frustrating, but determined combat engineers—armed with the tools and intelligence of the battalion, brigade, and division staffs—succeeded in turning the trend established in October 2004, when 70 percent of IEDs were located when they successfully detonated on a vehicle. By December 2005, more than 70 percent of the IEDs in the province were located by mechanical or visual means and only 30 percent were successful in engaging targets. While the commanding general's objective was achieved, this was but the first step of a long campaign.

Leaders of the 1st and 2d Marine Divisions pose during their transfer of authority conference.

News of the 224th Engineer Battalion's use of COTS software to analyze data from existing databases arrived at the Joint IED Defeat Task Force in midsummer 2005, and the task force commander visited the 224th in Ramadi. After participating in a route clearance mission there, using the battalion S-2's projection tools and operating picture, he said that the S-2 section provided more real-time, usable, and actionable intelligence than any other S-2 section he had ever seen. An overview of the process was briefed for the staffs of the 101st Airborne and 3d Infantry Divisions, the 130th Engineer Brigade, and other organizations.

(Continued on page 19)

21st Century Battle Command Training Is "Infield Practice"

By Mr. Joshua L. Hutchison

Information technologies have permeated every echelon of today's United States Army formations. This reality requires a persistent and reliable training methodology on which to build. In 2003, the Army established the concept of the Battle Command Training Center (BCTC). Today, more than thirty BCTCs have established training programs to meet the digital training needs of Army customers. These home station facilities are organized to provide on-demand training via battle command systems, simulations, virtual trainers, and gaming systems.

Anyone who has ever participated in team sports understands the basic tenets of battle command training. Individual skills development and repetitive and specific situational drills comprise the foundation for success. Baseball is fundamentally a team sport, yet it relies on the skill and knowledge of individual players who work to sharpen specific fundamental skills—throwing, catching, fielding the ball, batting, and running. Players then train in team drills to develop an understanding of the game strategy, situational awareness, and precise knowledge of what to do when the ball is hit to them or to someone else; for example, when should they force? When should they tag? Collective drills, such as infield and outfield practice—as well as situational scrimmages—ensure teamwork based on solid individual player skills. Specificity and repetition are the keys to making those game-winning, split-second decisions. On game day, the team will be confident and ready to play their game.

Today's battle command atmosphere within a digital tactical operations center (TOC) can be very much like baseball. A decision will be made in a split second, and execution of the play will decide the game. Decisions in battle have the same sort of split-second timing. Winning in battle saves lives and can change the course of history. The individual operators of battle command systems—such as Blue Force Tracker (BFT), Command Post of the Future (CPOF), and the Advanced Field Artillery Tactical Data System (AFATDS)—are the shortstop, second baseman, and first baseman. The TOC battle drills and unit staff processes/reporting are the team play expectations. Operators must train using specificity and repetition in responding to the ever-changing battle as directed by the TOC staff/team.

Photo by CC Lopez

A brigade staff hones battle command systems skills and validates staff processes during a multiechelon CPX in the Fort Bragg BCTC Brigade RTOC.

Photo by CC Lopez

A platoon element executes small-unit and convoy tactics training in the Fort Bragg BCTC gaming facility.

Operators possessing solid individual skills and TOC staffs/teams must understand what to expect as "the ball is hit." Battle command, just like baseball, is a collective effort in which winning happens often in the myriad of split-second "plays" executed by staffs who have honed their individual and team skills—which are only achieved through specific drills repeated frequently.

The XVIII Airborne Corps BCTC system includes a hub at Fort Bragg, North Carolina, and spokes at Fort Campbell, Kentucky; Fort Drum, New York; Fort Polk, Louisiana; and Fort Stewart, Georgia. The center understands today's battle command environment and has developed a home-station training solution to support individual Soldiers, teams, unit staffs, and commanders. The BCTC Training Program (BTP) provides a battle command training system that uses specificity and repetition to build a core of fundamental skills on which battle staffs can build their teams and "game strategy." Staff teams have the opportunity to practice individual and collective tasks many times and with many different scenarios to learn how their split-second decisions affect the outcome of the "game" and how they win or lose battles based on their decisionmaking and their execution of "plays." In this environment, staffs have the opportunity to see a scenario run in a number of situations and can apply their battle drills to suit the specific situation at hand, using the fundamentals they learned as they worked their way through progressive training levels at the BCTC. The BTP solution bridges the gap in battle command training that has long existed between unit set fielding (USF) at fielding and mission rehearsal exercises (MRXs) prior to deployment.

The BTP consists of two types of progressive battle command training: the foundation and command post exercise (CPX). This simplified approach is agile enough to rapidly incorporate new technologies and offers training solutions that are flexible and scalable enough to support any type of unit or mission. The BTP is battle command-focused and allows Soldiers, teams, TOC staffs, and commanders to sharpen and sustain their individual and collective digital skills—by tailoring the training program to their specific needs and then affording them the opportunity to practice those skills in a realistic "game environment" on a frequent basis. The Vice Chief of Staff of the Army has emphasized that a "focused approach to training" yields "unit agility and versatility"—and the BCTC executes this mandate.

Building the foundation takes varying forms of training. Operator courses conducted in a classroom environment provide individual Soldiers competencies on current battle command capabilities. The TOC Staff Workshop may be likened to "TOC 101": Conducted in a reconfigurable tactical operations center (RTOC) environment, it is collective training that consists of fundamental digital staff/team skills and competencies. Small-unit gaming is collective training for platoons and below to practice specific tactics and mission rehearsals.

A CPX builds on the foundation. Through these progressive and iterative training events, the elements are afforded the opportunity to train within the Army's long-established crawl-walk-run methodology. This is when "infield practice" occurs as staffs/teams work through standard battle drills, staff processes, and knowledge management practices. These tailored training events may be single or multiple echelons and are supported by the BCTC's unique set of training enabler capabilities, including the Joint Land Component Constructive Training Capability (JLCCTC), Battle Command Staff Trainer (BCST), and virtual and gaming systems—such as HUMINT (human intelligence) Control Cell (HCC) and Virtual Battlespace System 2 (VBS2™). An example of a highly integrated multiple echelon CPX may include a brigade TOC, several battalion TOCs, and several company command posts/company intelligence support teams (CoIST) executing their mission with a full complement of battle command technologies to provide communications and situational awareness—as well as a platoon or squad performing missions within a VBS2 scenario. These CPX solutions serve to guarantee success of staffs and teams in their culminating training event (CTE) and ultimately in their downrange mission.

The Army's evolving battle command training requirements are no different than the age-old individual and collective common task training (CTT)—the shortstop needs to know how to field the ball and what play to make, and the team must know what to expect. The BTP developed at the Fort Bragg BCTC provides the training solutions necessary to bridge the current gap in battle command training and serve as the home station nucleus of the Army's current live, virtual, constructive, and gaming (LVCG) and future integrated training environment (ITE) initiatives. BCTCs are poised to continue leading the way as the Army faces the daunting task of delivering relevant and realistic training for its ever-expanding "digital tool kit" in the 21st century.

It is "game time," the final phase of an operation: Two of three objectives have been achieved; the enemy is neutralized, and remaining threats are in retreat; a size, activity, location, and time (SALT) report on a possible vehicle-borne improvised explosive device (VBIED) is received via BFT; and this is a commander's critical intelligence requirement (CCIR). What does the operator do, and how does he do it? What is the battle drill, and how does the staff execute it? With fundamentals learned through specificity and repetition at a home station BCTC, the team will make the split-second decision, complete the play, and win.

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More information about the XVIII Airborne Corps BCTC training program may be found at Army Knowledge Online (AKO), <*http://bit.ly/BCTC-on-AKO*>, and by visiting the BCTC on Facebook and Twitter.

("Counter-IED," continued from page 16)

Contributions of the Engineer Regiment

Much has been written about the transition of the people of Anbar Province from active support for the insurgency in late 2004 and 2005, to neutrality, to eventual support for the coalition. The insurgency was more focused on reinforcing anarchy and disrupting security and stability than it was concerned with the welfare of the people; certainly this contributed to its demise in the province. There were many factors contributing to the success of U.S. forces in this part of Iraq. One key was the investment of 4,000 combat troops during the surge, since it provided commanders with options and flexibility and demonstrated commitment to the citizens. Much of the credit goes to the sheiks, imams, and local mayors, who led the Sunni Awakening movement at great risk to themselves. In addition, it took the exhaustive efforts of the II MEF and its ground combat element, the 2d MarDiv, to endure what amounted to an economy-of-force strategy in the province during the violent years of 2005–2006.

On 1 September 2008, the commander of U.S. forces in Anbar Province formally handed control to the people, an event that symbolized the greatest defeat of Al Qaeda since the Taliban had been initially dislodged in Afghanistan. The Engineer Regiment's leaders, noncommissioned officers, and Soldiers played a critical role in the tactical fight that set the conditions for slow but steady progress, resulting in a secure and stable environment in the province. The Regiment used initiative, flexibility, and ingenuity to provide the commanders with freedom of maneuver in their AOs in an environment of persistent unrest. It should come as no surprise that the C-IED fight in Anbar Province was executed with all three components of the Engineer Regiment: the 224th is an Army National Guard battalion, the 54th is an Active Army battalion, and the 321st is a United States Army Reserve battalion. It's an honor to serve.

Lieutenant Colonel Jacobus was a United States Army War College Senior Service Fellow at the Fletcher School of Law and Diplomacy at Tufts University when this article was written. He is currently the officer in charge of the Iowa National Guard Installation Component. He has served as Commander, Iowa Army National Guard Recruiting and Retention Battalion, and Commander, 224th Engineer Battalion, Iowa Army National Guard, including a deployment to support Operation Iraqi Freedom, where the 224th served as the divisional engineer battalion for the First, then the Second, Marine Division. He holds a bachelor's from the University of Iowa and a master's in public administration from Drake University.

BATTLE COMMAND STAFF TRAINING FOR ENGINEER COMMANDS

By Lieutenant Colonel Ted S. Weaver and Major Patrick J. Farrell

Deploying Reserve Component (RC) headquarters receive postmobilization battle command staff training (BCST), executed by the 75th Battle Command Training Division (75th BCTD) and hosted by a training support brigade (TSB). The exercise director, the TSB commander, is the validating authority. For most deploying RC engineer commands, the 3d Battle Command Training Brigade (3d BCTB) provides this training, and the 181st TSB at Fort McCoy, Wisconsin, is the validating authority.

The 3d BCTB trains other types of units as well as engineer battalion and brigade headquarters. On one mission, they may train a mayoral cell, followed by an infantry brigade combat team, then followed by an engineer brigade. It takes a wide skill set to train this variety of units. The brigade has no explicit concentration of military occupational specialties (MOSs), since several or all are needed for most units trained. Battle command tasks are universal to any battalion or brigade, but when training engineers, 3d BCTB is always looking for more MOS 21 series Soldiers. With that in mind, high-quality, mission-focused training is always afforded every unit that the brigade is tasked with preparing for deployment.

All postmobilization battle command training is a team effort. The most important member of that team is the engineer headquarters—the deploying expeditionary force (DEF) unit. The early participation of the engineer unit's commander and staff is essential to shape an effective, well-aimed exercise. Besides the 3d BCTB, essential members of the team include the TSB, the unit in-theater that is being replaced, and potentially additional members of the engineer community.

Battle Command

"Battle command is the art and science of understanding, visualizing, describing, directing, leading, and assessing forces to impose the commander's will on a hostile, thinking, and adaptive enemy. Battle command applies leadership to translate decisions into actions—by synchronizing forces and warfighting functions in time, space, and purpose—to accomplish missions. Battle command is guided by professional judgment gained from experience, knowledge, education, intelligence, and intuition. It is driven by commanders."[1]

"The operations process consists of the major command and control activities performed during operations: planning, preparing, executing, and continuously assessing the operation. The commander drives the operations process. Battle command is at the center of the Operations Process."[2]

Commanders and staffs use the military decision-making process (MDMP) and troop-leading procedures to integrate activities during planning. They also use other processes and activities to synchronize operations and achieve mission success.

Key to Mission Success

The commander of the 181st TSB served as the exercise director of multiple engineer brigade missions executed by the 75th. His training goal when executing BCST is to ensure that members of the DEF unit have a solid understanding of their mission and how they nest into their higher headquarters. He believes that it is a continuation of preparation for the transfer of authority (TOA), and he wants them to walk into the relief in place (RIP) knowing their knowledge gaps and what questions need answers. He also wants them to come to grips now with the specific issues they will face in-theater.

BCST often presents the first time that the full staff of officers and noncommissioned officers (NCOs) are able to work together doing their daily, tactical jobs in an integrated fashion with all of the staff sections. Many RC engineer units—and route clearance units in particular—arrive at the mobilization site with limited training experience in their new form as a modular force. For example, although the unit may have previous combat experience as a construction force, it may be mobilized for a route clearance mission with subordinate units that are not part of their home-station chain of command.

One example of the benefits derived by client units was given by the executive officer of the 724th Engineer Battalion, Wisconsin Army National Guard. He observed that the command post exercise (CPX) was critical to the growth of his staff. Prior to the experience, they were planning for deployment—but during the CPX, they transitioned to their tactical mission, which made the training highly beneficial.

A construction management and survey team works with an Iraqi role player through a translator to clarify requirements for a police station design.

The 3d BCTB timeline from receipt of mission to execution of the first event is typically 150 days. After the 3d BCTB conducts its own MDMP, the project officer contacts the TSB. Collaborative planning ensues between 3d BCTB, the TSB, and the DEF unit. Three essential elements that the team must agree to at the outset are the "Road to War" timeline, the exercise line of effort (LOE) framework, and a 3d BCTB seat on the leader's recon.

The timeline puts the key scenario development players in sync. One of the early events is the mission event list (MEL) development conference, at which the DEF unit provides input for the BCST scenario. Questions that are asked are—

- What are the unit's LOEs?
- What are the unit's battle drills?
- What are the commander's training objectives (CTOs)?
- What are some specific issues/events that they want injected into the scenarios?

Answers to these questions become the mission's LOE framework, which guides the writing of the MEL—the series of messages, role playing, and taskers that are delivered to the engineer headquarters during the exercise. The commander of the 181st sees this LOE framework as the centerpiece of any exercise: a "vital diagram" that defines how the unit fits into the higher headquarters plan. Since some LOEs are not easy to understand—for example, supporting governance—this creates dialogue with the unit in-theater.

Forming a Positive Relationship

The DEF units are pulled in many directions when preparing for deployment. From a distance, the postmobilization mission rehearsal exercise (MRX) is just one more of those tasks—and the DEF unit often misses the MEL development conference mentioned above. The 3d BCTB project officer and TSB will make a preliminary assessment of the DEF unit's mission, based on research, and develop a suggested LOE framework and CTOs for discussion.

The commander of the 724th Engineer Battalion said that the support received before a 75th Division exercise demonstrated a commitment to professionalism: The 75th's project officer wanted to work the CTOs into the exercise, which suggested a major recurring theme for a successful exercise—positive relationships. He was also the project officer for eight engineer battalions at Fort McCoy in 2009 and 2010. He keeps in contact with every unit once it deploys and ensures that each one is assisting the unit it will conduct RIP/TOA with at deployment's end. Additionally, he looks a year out, building relationships with units projected to mobilize for deployment.

During the 150 days prior to the engineer brigade mission, the 3d BCTB project officer (a lieutenant colonel) is in weekly contact with the DEF unit. His point of contact is usually the brigade's chief of staff or executive officer. For battalion missions, the timeline is shorter, and the point of contact is normally the engineer battalion commander or executive officer. The discussions often focus on—

- Updating training objectives to reflect changes in mission.
- Assessing the state of staff training, level of Army Battle Command System training (ABCS), and general expectation management.

The leader's recon to visit the unit in-theater is a key event in the preparation for the MRX. It is imperative for the 3d BCTB to have an officer on this event, which allows the 3d BCTB trainers the time needed to fully understand the mission and challenges that the DEF unit will face. This is the mission realism keystone for the model of training that 3d BCTB develops. It enables a meaningful scenario and realistic role playing of higher, adjacent, lower, supporting, and support (HALSS) units. Perhaps even more important than raw data collection during the leader's recon is that relationships are created with both the DEF unit and the unit in-theater.

The need for relationship-building here is impossible to overemphasize—the unit in-theater is the most credible source of relevant data for the realistic theater model of training. A steady stream of this data is needed during scenario development. A surge of this information provides additional realism during the exercise—often with only hours to acquire it. Without established relationships, the accessible raw data is often without context—and requests for information (RFI) will go unanswered or may be delayed beyond the latest time of value to the detriment of the training. The degree of mission success goes back to the human factor—solid, personal relationships.

This slow turnaround on exercise RFIs is consistently the greatest source of frustration for the DEF unit. Some types of required information are—

- Battle update briefs.
- Intelligence summaries (INTSUMS).
- Current operations orders (OPORDs).
- Fragmentary orders (FRAGOs).
- Operational graphics.
- Mission tracking tools.
- Unit status reports.
- Daily situation reports (SITREPS).

For an engineer brigade, the typical sequence of post-mobilization BCST events is three days of MDMP training, followed by two 3-day CPXs and an 8-day MRX. The battalion sequence is similar; however, a training support battalion will execute a mission rehearsal exercise (MRE). Battalions normally deploy with their subordinate companies, and the MRE incorporates the companies' boots-on-the-ground training mission into the BCST exercise.

MDMP Training—Not a Slide Show

When the war began, 3d BCTB taught MDMP to deploying units in a traditional classroom with 100 PowerPoint slides and a practical exercise based on a National Training Center scenario. This was an adequate model at the time. DEF units arrived at the mobilization station with poor MDMP skills, and this crawl method filled the training gap. For several years now, most units arrive at the mobilization site having basic MDMP skills. They only need a controlled environment, and 3d BCTB's MDMP course coaches them to keep on track through their preparation for deployment.

One method used to train MDMP ensures that the DEF unit does a classified MDMP event on their theater higher unit's OPORD and strengthens the staff's natural roles. The DEF unit produces a *straw man* order of their own. As the DEF unit transitions through the seven steps of MDMP, either the 3d BCTB MDMP facilitator or the DEF unit's chief of staff will give a short PowerPoint-based instruction for that step as a refresher. Since the chief of staff/executive officer is responsible for conducting staff training[3] and is their natural leader, it makes the most sense for the engineer staff to see him driving the process. The facilitator provides the tools: the PowerPoint instructions to introduce each new step in the MDMP process, a suggested timeline, doctrinal references, and hints as necessary.

The *straw man* order is based on both facts and assumptions and will need amendments when the unit gets into theater, but it is supposed to be the 75 percent solution. It also forces the engineer staff sections to develop their running estimates, lengthen the list of RFIs, and understand the fundamental baseline of their mission. In the process, the unit's ability to conduct MDMP is considerably sharpened, while the natural roles within the staff are strengthened.

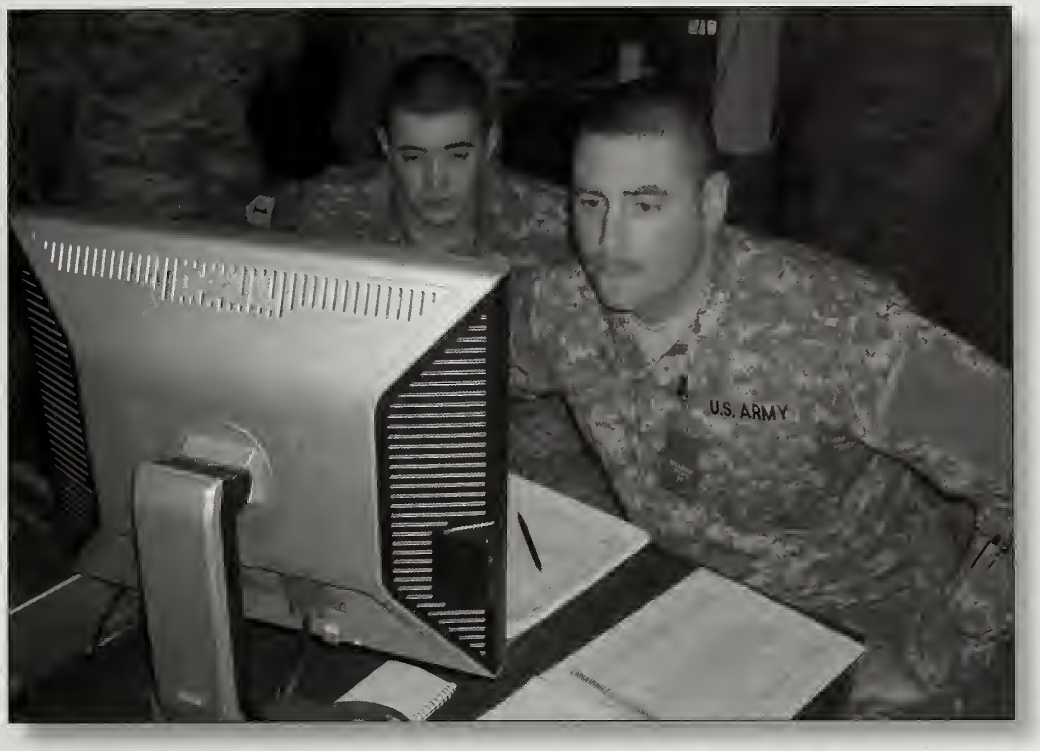
The chief of staff for the 16th Engineer Brigade was pleased with this method of MDMP training, the success of which he attributed to having the 3d BCTB MDMP team and the senior mentor with them every step of the way.

Mission-Focused Staff Integration

The basic pattern for the CPX and MRX is the same. Messages come into the command post in a variety of ways—e-mail, instant messaging over the classified "closed-loop" network, Secure Voice Over Internet Protocol (SVoIP) telephone, live role players, or frequency-modulated (FM) radio. Yet another method is over the Command Post of the Future (CPOF). Battalions use Blue Force Tracker during their CPX and MRE. As the battle staff is working these issues, reacting to battle drills, exercising their standing operating procedures, and receiving and submitting reports, the higher headquarters sends down major taskers relating to missions that the unit is expected to execute when deployed. These taskers may require additional analysis through MDMP. Units brief their products to role-played VIPs—often division and corps staff. Simultaneously, there are competing mobilization requirements. These may include new equipment fielding, crew-served weapons makeup, central issuing facility issue, medical issues, equipment moving to theater, departure of advance party Soldiers, and genuine

Uniform Code of Military Justice (UCMJ) actions. Although units often say these distracters are artificial, these same sorts of issues compete for attention in-theater.

The assistant chief of staff, signal (G-6) for the 416th Theater Engineer Command changed his mind on this when he served in Afghanistan as the chief of staff for the 420th Engineer Brigade. They experienced heightened activity and had 10 percent of Soldiers on leave and the headquarters split between two locations. The MRX helped them get ready.


Soldiers conduct a shift change brief during a command post exercise at Fort McCoy, Wisconsin.

The main differences between the CPX and MRX are the goals and intensity. The goals of the CPX are for the staff to identify their roles and responsibilities, set up a functioning command post, establish processes for information analysis and dissemination, establish their battle rhythm, validate battle drills, and gain situational awareness by posting relevant information to their common operational picture—for example, battle tracking. These are parallel with opportunities to continue their MDMP training and practice briefing skills.

By the start of the MRX, the basic skills learned in the CPX are in place, and they are polished for eight more days. In addition, the intensity of the exercise increases with more frequent and complex scenario "injects" from the HALSS role players. Key leader engagements and visits with real local national role players challenge and enhance the commander and staff's preparation for their mission downrange.

During the MRX, the TSB trains the brigade commander's personal security detachment (PSD). A series of field events are injected into the exercise. There are multiple opportunities for the brigade design engineer technical section (G-7) to conduct quality control/assurance, recons, surveys, and other engineering tasks outside the wire. These missions provide the opportunity to use the PSD for escort. PSD training includes reacting to numerous attacks and a debriefing with the intelligence staff officer (G-2) upon return. This information becomes part of the G-2's intelligence picture.

For the primary staff officers, the value of the training is obvious in the quality of the products, increased efficiencies developed, and improved briefing skills by the end of the MRX. However, throughout this entire process, whole lists of skills are also being sharpened by the enlisted Soldiers, battle staff NCOs, and junior officers, as they develop an effective command post.

Among the most important skills developed is their ability and confidence with Army Battle Command Systems and CPOF. The experience is stressful, but necessary, and Soldiers react positively.

Observer-Controller/Trainers

From the MDMP through the end of the MRX, 3d BCTB and First Army TSBs position observer-controller/trainers (OC/Ts) with each staff section. During the exercise, the OC/Ts do not evaluate as much as they provide feedback based on a combination of Army Doctrine and the Combined Arms Training Strategy (CATS). These three to five tasks (per staff section) are agreed on with the DEF unit in advance. The 3d BCTB believes that a positive relationship between the OC/T and the staff section enhances the training.

In addition, 3d BCTB also uses a tool developed by the former commander of the 4th Cavalry TSB, when he worked on training engineers along with the 3d BCTB early in this present conflict. He called his method of evaluation *staff assessment standards.* In essence, he condensed the doctrine in FM 3-0, FM 5-0, and FM 6-0 into five main areas—time management, staff estimates, common operational picture, information analysis and dissemination, and generating relevant options. If a staff can perform well in these five critical areas, they will work efficiently: *"Each of the five categories relies on staff integration for the section to be efficient. The staff must understand how their section* *affects other sections, and they must understand the purpose and audience of running estimates. The staff must be integrated and have a mutual view of the battlefield and the commander's desired end state to achieve the desired effect; without integration, the staff will lack clarity and unity of effort."*[4]

There are multiple opportunities for self-discovery within the staff. Every evening the OC/Ts conduct an informal after action review (AAR) with their staff section, focusing on one or two areas to improve for the next day. The CPX ends with AARs conducted by the 3d BCTB mobile training team chief, and the MRX concludes with an AAR conducted by the TSB commander. The AARs focus on CTOs, what needs fixing, and who is going to fix it. The facilitators strive to maximize the DEF unit's participation and self-discovery.

Challenges

Battle command tasks are common to any field unit, and 3d BCTB can provide BCST under any circumstances. DEF units, however, want a high degree of realism. A challenge for 3d BCTB is having enough engineer officers (with specific theater experience) for all the requirements of an exercise. Three or four engineer OC/Ts are enough to cover down on the engineer brigade's design engineer technical section (G-7) and operations staff section (G-3). That is usually all that the 3d BCTB has available. Unfortunately, that often does not leave many engineer-trained role players who often have to answer technical RFIs for the HALSS cell.

Having a 3d BCTB Soldier on the leader's recon is essential in developing a realistic exercise baseline for the role players. Relationships made on the leader's recon result in prompt turnaround of RFIs. Subject matter experts sent back by the deployed engineer unit (while it is still in-theater) to facilitate the BCST have a huge impact on realism, including expediting accurate answers to RFIs. In reality, this provides a 30-day jump start to the RIP/TOA process.

The 3d BCTB project officer started contacting units (scheduled or expecting to be scheduled for the next rotation) and requested that they send Soldiers forward to observe their predecessors' BCST events. Not only did they learn about the CPX and MRX, but they became an asset for the OC/Ts and HALSS.

The project officer of the 176th Engineer Brigade mission received three members of an engineer battalion command group to role-play themselves in the HALSS during the exercise. It does not get any more real than that. There is a substantial payoff to any unit that participates. They are training themselves and mastering their higher headquarters' standing operating procedure at the same time. One further resource is sending the DEF unit's liaison officers to participate. These engineer officers can work in the HALSS, acting in their real liaison officer function as well as providing an engineer flavor to the role playing.

Conclusion

Creating a BCST event for a deploying engineer unit takes months of preparation and continuous coordination between different entities. The 3d BCTB, along with two TSBs, has trained nine engineer brigades and most of their subordinate battalions in the past five years. Together they have developed an effective model of BCST and have fostered relationships within the engineer community. The essential exercise ingredients boil down to theater realism with recent and relevant classified data and an engineer unit (using staff integration) working on the same issues they will encounter in-theater. Fostering positive relationships between the DEF unit, 3d BCTB, the TSB, the unit in-theater, and the engineer community at large is key to the success of the BCST and the unit's deployment.

Lieutenant Colonel Weaver is a field artillery officer who is currently mobilized and serving in the 3d BCTB, 75th BCTD, Fort Sheridan, Illinois. He was the project officer of both the 420th Engineer Brigade and the 41st Infantry Brigade Combat Team missions. He has executed key roles on ten other brigade and battalion MRXs and was the commander of Service Battery 1/121 Field Artillery, and the S-4, 7th Brigade, 84th Division. As a civilian, he teaches high school chemistry in Racine, Wisconsin. He holds a bachelor's in secondary education broad field science from the University of Wisconsin–Milwaukee and a master's in curriculum and instruction from National Louis University, Evanston, Illinois.

Major Farrell is an engineer officer serving as an OC/T with 2d Battle Command Training Group, 3d BCTB, 75th BCTD, in Fort Sheridan, Illinois. During that time, he has participated in multiple roles, including project officer, HALSS engineer subject matter expert, and OC/T for five engineer brigade BCSTs and five engineer battalion BCSTs as a mobilized Reserve Soldier. Previously, he was the S-3, company commander, a battle captain, and S-1 with the 244th Engineer Battalion in Denver, Colorado. He holds a bachelor's in civil and environmental engineering from Cornell University and owns Castle Engineering Solutions, LLC, a forensic structural engineering consulting firm. He is a licensed professional engineer in Wisconsin and Colorado.

Endnotes

[1] Field Manual (FM) 3-0, *Operations*, 27 February 2008, p. 5-2.

[2] FM 5-0, *The Operations Process*, 26 March 2010, p. vi.

[3] FM 6-0, *Mission Command: Command and Control of Army Forces*, 11 August 2003, Appendix D-9.

[4] Jeffrey R. Sanderson, "4th Cavalry Brigade Staff Assessment Standards," *Armor & Cavalry Journal*, May–June 2008, p.16.

SUPPORT THE CASTLE:

A Forward Support Company in Action

By Captain David L. Brewer

A truck driver from the FSC provides security while his platoon changes a tire on an M870 semitrailer.

In 2007, the United States Army Reserve completed its transformation to modularity. The impact on the Engineer Regiment was immediate. Companies, detachments, platoons, and even squads were now organized to serve as elements of a tailored force package, designed to complete a specific mission or task, rather than deploy with an organic engineer battalion. The direct impact on the engineer battalion headquarters was also instantaneous, eliminating the headquarters support company with its 200 or more Soldiers, and developing two separate support companies that together formed the battalion headquarters element. The battalion headquarters became a headquarters and headquarters company (HHC), designed to support the staff sections, and a forward support company (FSC), intended to conduct the sustainment functions needed to sustain an engineer battalion. In many battalion headquarters, the HHC quickly came into its own and began serving as the "staff company," but the best employment of the FSC proved more elusive, and it has often been underutilized. It is the intent of this article to provide information on how an FSC is designed to work for an engineer battalion and how it worked for the 844th Engineer Battalion during the unit's recent deployment to Baghdad, Iraq, supporting Operation Iraqi Freedom.

Unlike any other company in the Regiment, the FSC is purely logistical, manned entirely by Quartermaster, Transportation, and Ordnance Branch Soldiers. In a modular engineer battalion, the FSC is responsible for providing food service, haul and transportation, Class III supplies, water distribution, and maintenance and recovery support. It is worth mentioning that not all FSCs are the same, and an FSC supporting an aviation or armor battalion looks slightly different from the FSC supporting an engineer battalion. This is linked to the overall intent of modularity, which places the right mix of sustainment elements into a battalion headquarters and attempts to eliminate the misallocation of sustainment assets and personnel. Furthermore, due to the logistical nature of engineering tasks, an FSC has a unique relationship with the battalion supply officer (S-4), who is a chief customer of the unit. The S-4 often serves as the materiel manager for much of the

An FSC Soldier services an M916 light equipment transporter at Camp Striker, Iraq.

supplies transported by the FSC and relies heavily on the FSC for the requisition and use of Class IX repair parts.

Theater Factors and Flexibility

In a nonpermissive environment such as Iraq, the FSC supporting an engineer battalion must be extremely versatile to achieve its overall mission of providing logistical support to the battalion headquarters and the modular engineer elements attached to it. The force mix for a modular engineer battalion can vary drastically, depending on the battalion's mission in-theater. During the 844th's deployment to Iraq, the battalion consisted of one survey design detachment, two horizontal companies, one vertical company, one bridge company, and one United States Air Force field engineer team (FET). The force structure therefore dictated the requirements of the FSC. For instance, the haul and transportation requirements for moving two horizontal companies were more than the FSC was designed to support, so adjustments were made internally at the company to fulfill this requirement. In addition, the maintenance support requirements were affected by the force structure, resulting in the maintenance platoon being organized into field maintenance teams that were able to support organic movements, fulfill emergency work orders, and complete scheduled services simultaneously.

A major factor determining which sustainment functions an FSC provides in-theater and how those functions are carried out is the location of the battalion. Located at Camp Striker on the Victory Base Complex in Baghdad, the 844th benefited from the massive dining facility, large Class III supply point, and water treatment facility on the base. Access to these facilities impacted the FSC's mission and allowed the company to task-organize itself in a way different from the standard set by the unit's modified table of organization and equipment (MTOE). Due to a lack of a food service support requirement on Victory Base Complex, the company was able to cross-train the majority of the company's field feeding section into a convoy security element to support the transportation operations of the distribution platoon. The same was done for the organic petroleum specialists and water treatment specialists assigned to that platoon. This allowed the company to provide its own security for the haul section and manage its own organic convoys, thus meeting the haul support requirements for moving two horizontal companies throughout the theater of operation. On occasion, the company also pulled Soldiers from its headquarters and maintenance platoons to support time-sensitive transportation operations, making it possible for the unit to support multiple movements simultaneously. This flexible use of company assets enabled the FSC to complete a variety of missions in Iraq and support a 1,000-Soldier engineer task force.

In addition to the location of the battalion, the equipment allocated to the FSC in-theater determines what sort of mission sets can be completed. The FSC's theater-provided equipment in Baghdad was significantly different from the MTOE equipment used at home station. The primary example of this was the equipment designated for the company's haul section. According to the MTOE, the main mover for the haul section is the heavy expanded-mobility tactical truck (HEMTT) with a palletized loading system. In Iraq, however, the company was only provided one HEMTT for palletized loading and another equipped with the older load handling system. The equipment used most by the haul section in Iraq was the M916 light equipment transporter with the M870 low-bed semitrailer. The M916 and M870 combination was an essential transportation asset and could be used to haul both Class III and Class IV supplies effectively. Nevertheless, the shift from MTOE to theater-provided equipment forced the FSC to retrain the haul section's Soldiers on the M916 and M870 rather than operate the equipment it was familiar with at home station. Luckily, FSC leaders were aware of the equipment shift before mobilization, so the unit's premobilization training focused on adapting to it. This allowed the company to become combat effective quickly once it arrived in-theater.

Perhaps the most important aspect determining the FSC's role in-theater is the battalion's mission. During its deployment, the 844th's primary mission was to support the responsible drawdown of forces as the corps construction engineer battalion. The mission required subordinate companies, platoons, and detachments to operate in all three U.S. divisional areas of responsibility in 14 of 18 Iraqi provinces. The battalion's subordinate engineer elements did everything from building staging yards for transporting supplies out of country to removing bridges that were no longer being used. Therefore, as the principal sustainment unit in the battalion, the FSC was required to provide simultaneous support to the multiple engineer elements operating in disparate locations throughout Iraq. Performing sustainment functions virtually everywhere at once forced the company to remain flexible. In addition to the mission requirement of operating in a massive operational environment, the battalion and the FSC had to deal with movement restrictions imposed by the government of Iraq. These restrictions varied throughout the country and sometimes required unit convoys to move in conjunction with Iraqi Security Forces. Under these conditions, sustainment requirements often changed, and change became a way of life. Therefore, the FSC established the principle of being "actively reactive," which meant that the company anticipated possible changes and did whatever was possible to plan for likely contingencies. By building flexible plans and remaining actively reactive, the company succeeded in providing adequate logistical support throughout the theater of operation. However, versatility is not the only prerequisite for being a successful sustainment element in-theater.

Additional Best Practices

Along with being flexible, it is extremely important for an FSC to establish strong lines of communication with the modular elements within the battalion. During the 844th's deployment, the FSC conducted 70 organic missions and supported more than 60 missions with its available haul and transportation assets. The company also conducted numerous missions within the Victory Base Complex, moving Class III, Class IV, and Class IX equipment for multiple units. To coordinate these missions, the FSC designed a haul request form for units requesting transportation support. Units were able to request available assets directly from the FSC, which then notified the battalion plans and operations (S-3) section of the planned configuration of the company's transportation assets for

An FSC security team positions its gun trucks during a halt on a main supply route.

The FSC distribution platoon loads construction materials for base support missions throughout Iraq.

the next seven to ten days. The S-3 approved the allocation of transportation assets or, on special occasions, reprioritized requests based on battalion requirements. The direct lines of communication between the FSC and the modular engineer companies resulted in increased throughput and better velocity management of battalion transportation assets. A similar system was established for requesting maintenance and welding work orders, using the Standard Army Maintenance System–Enhanced, and resulted in the delivery of efficient maintenance support within the battalion headquarters and to the subordinate elements.

The most essential lesson learned by the FSC, 844th Engineer Battalion, from its time in-theater was the importance of fostering a positive vendor-customer relationship with subordinate units supported by the battalion. Tracking what each company was doing at any given time was an essential tactic for finding opportunities to support the battalion, while determining the best methods to do so. This also allowed the FSC to forecast future support requirements of the subordinate units. For example, if a company or platoon was moving from one location to another after completing a project, the opportunity existed to provide transportation assets to move the element and provide maintenance support while the element reset for a follow-on mission. Being proactive and finding these opportunities was only half the fight. The FSC also had to provide efficient and effective support on the modular company's terms and timeline. Most of the time this was as simple as staying in contact with the different companies throughout the stages of their projects and selling ideas where the FSC could help provide assistance, freeing up engineer assets to complete more projects. This often led to unique missions, such as providing meals at a jobsite, but it built a reputation for the FSC that would in turn create additional opportunities.

Summary

By remaining versatile, maintaining lines of communication, and providing great customer service, the FSC, 844th Engineer Battalion, built a solid reputation while in Iraq. The company became the premiere support element within the battalion and was called on to do everything from supporting the operational environment owner with welding wire mitigation kits for the mine-resistant, ambush-protected (MRAP) vehicles to running combat logistics patrols with Special Forces. The company even supported the battalion's Iraqi Army partnership efforts by providing food service and maintenance training to the Iraqi soldiers. During the unit's ten months in-theater, it hauled more than 500 loads, serviced more than 20 joint security stations and contingency operating bases throughout Iraq, and completed more than 400 maintenance work orders and 1,000 technical inspections during 10,000 man-hours—all while maintaining a rigorous service program that contributed to the battalion's 90 percent or better operational readiness rating. The example of this company was affected by the battalion's force structure, location in Iraq, mission, and the company's positive approach to providing sustainment support. No FSC will have a completely similar experience. However, the FSC did exactly what it was designed to do—support the engineer battalion and the modular companies by serving as a logistical lifeline, allowing engineers to do what they do best: build.

Captain Brewer is the commander of Forward Support Company, 844th Engineer Battalion, in Knoxville, Tennessee. He has served as the battalion's engineer plans officer and as commander of the 739th Engineer Company (Multirole Bridge) in Granite City, Illinois. He holds a bachelor's from the University of Missouri–St. Louis and is a graduate of the Engineer Officer Basic Course.

Photo by First Lieutenant George Holland

Quality Verification of Contractor Work in Iraq

By Captain Gregory D. Moon

As part of civil-military operations in Iraq, United States Army engineers perform quality verification (QV) of contractor work in areas that may not be fully secure or are exposed to insurgents. Rebuilding projects are targets because restoration of normal life works against the terrorists' goals. In the densely populated section of Baghdad known as Sadr City, terrorists in 2008 had been stopped from openly attacking or sabotaging civil works projects but still emplaced improvised explosive devices (IEDs), used snipers, and intimidated the civilian population.

QV is needed to assure the owners that a contract is being fulfilled and that they are getting what was paid for. It is the process the government uses to check on work being performed, determining that progress is satisfactory and will result in a completely functional product in the time allowed by the contract. Part of the mission of the 729th Facility Engineer Detachment (FED) during its deployment was to support Task Force Gold in Sadr City, assessing the progress of Iraqi contractors on jobs paid for by the Commander's Emergency Response Program (CERP) and the Iraqi CERP. The security situation was too unsettled to allow a daily presence. There were active threats from IEDs, indirect fire, and snipers. Movement in the area required a patrol in mine-resistant, ambush-protected (MRAP) vehicles to move as close as possible to each work site. Once on-site, teams acted as quickly as possible to assess progress and then move out. To reduce danger, regularly scheduled visits and prior notification of contractors were avoided.

The Iraq counterinsurgency strategy in use in 2008 was "Clear, Hold, and Build," and Task Force Gold was established to help in the "Build" part of the plan. Part of the work involved actual construction, while another part included mentoring the local government in the care of its public sector responsibilities. Task Force Gold operated on the terrain of 3d Brigade, 4th Infantry Division, part of the Multinational Division–Baghdad, with an engineer commander and a mixed civil affairs and engineer staff. Some of its operations were service projects involving cleanup and debris removal, but a growing number of projects involved construction—renovating schools, reconstructing public health clinics, building public spaces such as parks and sports fields, repairing infrastructure such as sewers and water pumping stations, and providing generators for local power needs.

QV operations were accomplished by sending out teams of two to four engineer Soldiers as part of a civil affairs patrol or on a QV-specific mission with a security team to secure a work site while it was evaluated. All movements in Sadr City involved several vehicles and a sizable

Photo by First Lieutenant George Holland

Soldiers enter the public clinic for inspection of local contractor work.

number of Soldiers. The objectives for a typical patrol consisted of checking six to eight projects that required a team to dismount and three or four projects that could be evaluated while mounted. Such missions took three to four hours from assembly to return to base. The return to base did not finish work for the day though. QV teams had to prepare reports for each project and a daily summary for 4th Infantry Division—and eventually Multinational Force—headquarters. These reports usually took five to six hours and another hour was spent in a daily briefing to the task force commander.

Project Selection

The civil affairs teams nominated projects, and a project engineer prepared project packages that were submitted to the brigade and division for staffing and funding. Once contractors were notified and work was started, the QV work began. Funded projects were listed in order of the start work and estimated completion dates. Mission-dependent considerations also helped prioritize the inspections.

Coordination between the QV team and security detachment was an important planning consideration. When QV teams from the 729th FED were conducting inspections for Task Force Gold, the security detachment was not stationed at the same location as the task force. That meant

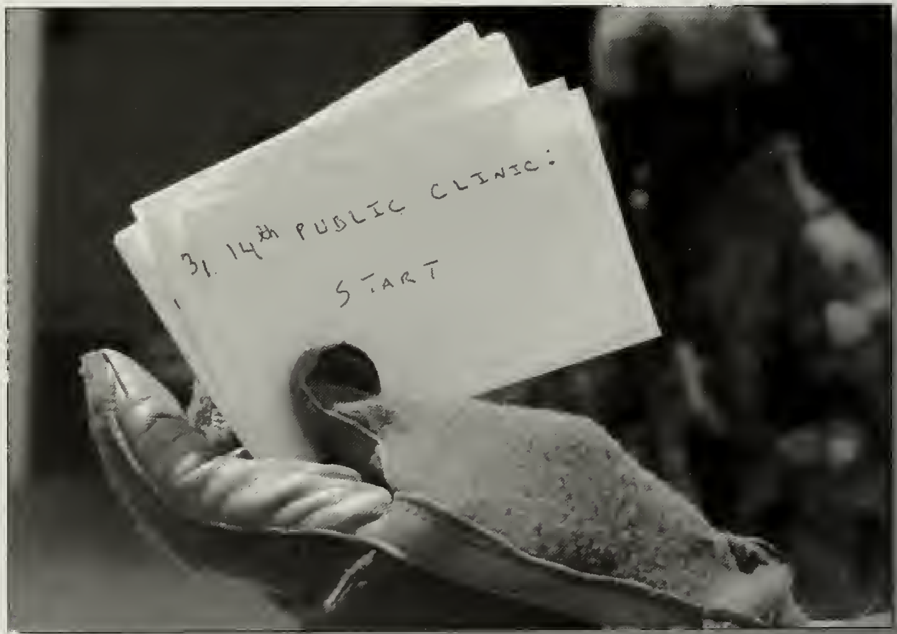


Photo by First Lieutenant George Holland

Using a digital camera, a member of the inspection team records a starting picture.

> ***"[Quality verification] ... is the process the government uses to check on work being performed, determining that progress is satisfactory and will result in a completely functional product in the time allowed by the contract."***

that coordination for the daily project list was performed in three steps. First, projects for the upcoming week were selected at the task force. Then that list went to the leader of the security detachment, who used available intelligence about the area to generate a schedule for each day that would avoid predictable patterns of travel. Finally, the schedule went to the QV team.

QV teams prepared for patrols by reviewing the package for each project to be visited that day. The aim was to know what work was required for each project, observe what was being accomplished, note key items from the scope of work, and verify the presence of high-value items such as generators, air conditioning units, and other large equipment. The security detachment confirmed current intelligence and changes in project priorities, then gave the QV team the sequence of sites to be visited. The entire patrol got the patrol order for the day and rehearsed dismount, assembly, movement to the work site, and actions at the site. Once this was accomplished, the patrol loaded up and moved out.

Inspection Process

The basic QV team was two Soldiers and an interpreter. One Soldier was designated the photographer, and the other accompanied the interpreter. The photographer took pictures that identified the site, showing its overall condition, illustrating problem areas and good work, and recording high-value items and high-value parts of the job. The team member with the interpreter started with a quick interview with the job superintendent or the most knowledgeable person on-site. Basic points confirmed that the team had the right place, the number of workers who were on-site, what the contractor was doing that day, whether high-value material was on hand, and if it had been installed. Next, the interviewer walked the site to observe overall progress and, if time and conditions allowed, make on-the-spot notes about the project. Then it was on to the next site on the day's list. The security team usually cleared each site. Since the U.S. government was paying for the work, the teams didn't kick down doors to enter locked rooms. If the contractor wasn't on-site and the team could not gain access to a room, it was noted. Occasionally, the teams suspected the presence of insurgents, in which case the site visit was halted.

The practical reason for using at least two Soldiers on the QV team was to speed up the process. Leaving the cameraman free to move around and take pictures made efficient use of limited time on-site. However, a camera leads to tunnel vision. The Soldier acting as the interviewer-recorder got a wider view of the site and generally was the leader of the assessment. Index cards with the name of the project were photographed at the beginning of a site visit, then used to record notes about the work.

After returning to the security station at the end of patrols, teams performed maintenance and worked on project reports. The 729th FED teams organized site visit pictures into computer files that kept each day's projects together. Project folders also kept together all reports on individual projects. Once photographs were downloaded, report documents could be prepared. Information management authorities should note that this information must be moved onto the local network, so blocking portable data storage devices from network access stops the reporting process.

Project Reports

The initial general project report template didn't fit the information gathered by the teams, so later reports were based on each project's line items of work. Using the line items from contract packages yielded a breakdown with a quantity or dollar amount attached to each item. This allowed QV teams to estimate the percentage of the work completed. Since information for the project reports is collected quickly, it is short on details. If there are specific items of command interest, QV teams should be notified before site visits.

Project reports contain several types of information:

- Confirmation that work is or is not being performed.
- Estimates of the amount of work accomplished to date.
- Estimates of the quality of work.
- Predictions of whether or not the contractor will complete the project within the contract time.

Each evening, individual project reports and an executive summary were sent to headquarters and an update was presented to the task force commander. QV teams also assisted project officers with pay requests from contractors and talked with contractors about quantity and quality of work at specific sites.

Equipment Needed

The QV teams need several pieces of equipment, including—

- **Digital camera.** A high-quality digital single-lens reflex camera with high-speed storage cards and a fast lens takes pictures quickly and with sufficient quality to be used for other purposes, such as information operations. Point-and-shoot cameras process pictures more slowly, thus slowing down site visits.

- **Digital voice recorder.** This would allow immediate and accurate recording of comments and questions about the work at each site. However, notebooks and note cards are also useful for writing and memory aids and may even offer some advantages. For example, if the order of visits changes, note cards can be rearranged and kept in order.
- **Computer.** The QV team needs access to a computer hooked up to the local network to allow photos to be downloaded from portable storage. Because the reporting process takes a lot of time, a computer dedicated to that effort is necessary. Ideally, the work should be done on nonsecure computers, because the data has to be shared not only with U.S. forces but also with local contractors.

Planning Factors

Mission, enemy, troops available, terrain, and time available (METT-T) analysis works well to develop planning factors for QV.

- **Mission.** The description of the type of projects to be checked is important. Typical missions are relatively small in scope and total cost. Larger projects require a secure environment to be executed successfully. Depending on the phase of a project, even relatively modest ones can require a lot of time to check. For example, the final inspection of a school renovation requires more time and effort than the initial checks. Commanders should be aware of the types and number of projects being checked.
- **Enemy.** Local contractors won't work if there is an active threat facing them. Given that the risk to contractors is low enough for them to work, some threats may still exist. During the 729th's deployment, IEDs were a possible danger during movement to the work site, while at the site, and while moving away from the site. Indirect fire and snipers were also a consideration. Avoiding predictable patterns of movement and not scheduling meetings with the local contractors ahead of time reduced the danger from terrorists.
- **Troops available.** Experienced QV teams can do their jobs quicker, and their estimates will be quantitatively and qualitatively better. The security element

Photo by First Lieutenant George Holland

Soldiers move through the Al Yarmouk School.

must be large enough to clear and secure sites for the duration of visits. The security element averaged 20 Soldiers on 729th FED missions. An interpreter is necessary in most cases.

- **Terrain.** The farther projects are from the base of operations, and the farther they are from each other, the fewer that can be inspected in a given time. In a relatively compact area such as Sadr City, projects may be within an area of five or six square miles. In other cases, projects may be scattered all across a province.
- **Time available.** Project reports impact time-on-task on a daily basis. The more in-depth and detailed the reports required by headquarters, the more time they take to generate. If reports are modified to reflect specific project requirements, the reports become easier to complete. Commanders should tailor their specific information requirements so that the QV teams can get on-site, collect the information, and depart—minimizing the number of trips to the site.

Potential QV Team Members

Engineer NCOs in construction engineering supervisor military occupational specialties and company grade engineer officers have the background to get a good start as QV team members. Experience in supervising unit construction projects is a good place to sharpen the ability to assess work. Another way of gaining useful experience is to check contractor work. Officers and NCOs can gain this by helping the Directorate of Public Works at their home station to perform QV work. Another avenue for officers and NCOs to explore is to establish a relationship with the United States Army Corps of Engineers (USACE) to work on projects at or near their home stations. A good class to introduce the basics of QV is "Quality Verification for General Construction," available through the USACE Proponent-Sponsored Engineer Corps Training (PROSPECT) program.

These recommendations are necessary because of the lack of experience of many Soldiers in-theater. They were enthusiastic but had not been allowed to do much practical construction work. This was apparent in the way they handled their tools and equipment and in some of their judgments. This lack of experience also affected command decisions about which units to employ. United States Air Force and United States Navy construction units were preferred for performing construction jobs. They were more effective because they had practiced their specialties more than their Army counterparts. *Building Great Engineers* starts with Soldiers performing their specialties at home and taking that experience into theater.

Captain Moon was commissioned through the Reserve Officer Training Corps at Auburn University with a bachelor's in civil engineering. He served for ten years on active duty and for seven years in the United States Army Reserves. He enlisted as a staff sergeant construction engineering supervisor in 2002 and was mobilized to Iraq in 2008. He applied for and received reappointment as a captain in 2009 and continues as a member of the 729th FED. He works for the Federal Aviation Administration as a civil engineer.

("Lead the Way," continued from page 4)

Control. Traditionally, this addresses the importance of controlling the movement of the unit while you move from one place to another and the actions of the unit on the objective. In this case, I think a leader should consider the management of the construction phases of the COP. Each COP should provide the basics of protection, health, and safety for the engineer; it starts from the ground up. There are lots of project management tools to help the engineer, but it takes someone on the ground to organize the construction effort to meet the commander's objectives.

Common Sense. An overused term nowadays is *expectation management*, but it does have applications in this case. The engineer cannot pour all of the precious construction resources of the brigade into one platoon-size COP. The commander and his engineer must clearly define the basic standards for security, functionality, and life support. It's up to the engineer to take a commonsense approach and ensure that the life support standards of construction aren't compromised just because a subordinate commander truly wants a castle for his COP. Remind leaders of the old saying of "improving your fighting position" but within reason. Tell them to stay away from those pieces of construction that will get a Soldier seriously injured or killed, such as electrical work. Leave it for the experts, the engineer.

Combat, construction, and geospatial engineers are all involved in the process of building a COP. The Regiment expects you to be an expert in your field and recognize that it's essential for today's engineer to embrace the three disciplines of engineering to solve the commander's most difficult problems. It's not rocket science, but it is a matter of physics. Whether it's building something or blowing stuff up, it's the brave Soldiers who have embraced their profession who step forward to say, *"Let Us Try, Sir!"*

Or you can stand in line and watch the heads roll... .

Construction Unit Training Challenges:

A Proposal for Construction Engineer Qualification Tables

By Captain Jacob R. Kondo

The deployment rhythm for a typical engineer construction unit has had a negative effect on the quality and length of training in these units. The emphasis on quality commercial construction has declined in these units while the type of "hurry-up-and-build-it" projects typically found in combat zones has increased. The construction tasks in the Soldier Training Publications (STPs) are not being taught and evaluated to the standard of commercial construction, leaving Soldiers inexperienced except for the brief overview they receive in advanced individual training (AIT). Even AIT does not teach all of the tasks in the STPs. Some of these construction tasks require the Soldier to learn at the unit. Construction units in today's Army need a solid set of guidelines—similar to the standardized method used by most combat engineer units—to train and evaluate their subordinate units.

Proposed New Tables

The concept of combat engineer qualification tables can be used in conjunction with the construction tasks established in the individual military occupational specialty (MOS) STPs to form new construction engineer qualification tables. The construction tables would have a biannual schedule that provides construction MOS Soldiers a refresher on AIT-taught tasks and teaches actual unit-specified tasks that are in the STP. This schedule would also ensure that companies have a mandated time to train their Soldiers on construction STPs. This proposed schedule and the construction tables are a method the construction battalions can integrate into their training calendars, giving a solid set of guidelines to assess the companies.

Table I. Construction tasks can be divided into three different engineer tables and should be taught using the *crawl-walk-run* method. Table I, in the *crawl* phase, begins with individual companies teaching Soldiers straight from the field manuals (FMs) and STPs in a classroom-type environment, where most of the learning is done by reading the FMs and applying the lessons in a practical exercise. Outside agencies can help during this phase as well. The 92d Engineer Battalion invited representatives from several organizations to Fort Stewart, Georgia, to teach its Soldiers. These organizations included AutoCAD®, EMC Engineering Services Incorporated, the United States Army Corps of Engineers (USACE), the Directorate of Public Works (DPW), Hilti Corporation, and Stihl® Incorporated. All of them can have a part in the one-month block of instruction for Table I, but units must plan thoroughly to integrate these resources into training.

This means that the MOSs of greatest benefit to Soldiers need to be assigned to the class. For example, the 92d sent its company executive officers and drafters to the AutoCAD class, construction supervisors to the EMC and USACE internships, and skill level one and two Soldiers to the construction tools and equipment licensing classes presented by Hilti Corporation and Stihl Incorporated. All of this outside training should be within the one-month time frame and synchronized with each company's classroom training. Once the companies have completed their internal evaluation of Table I, they can request an evaluation from the battalion. The evaluation will consist of a written test based on the guidelines established in the STPs. Once all Soldiers pass the written test, the unit can proceed to the *walk* phase, or Table II.

Table II. Table II consists of small "battalion-owned" projects that the companies must complete and inspect before moving on to the next table. Battalion-owned means that the projects are constructed for the battalion and no other outside unit or agency. This approach ensures that the Soldiers remain in a focused learning environment. The companies begin with the design phase of the project when the company construction officer and the platoon leader develop a design and a bill of materials (BOM) based on the scope of work derived from the subject areas of the STP. For example, if a vertical company has reached the *walk* phase, then its individual project must include a scope of work that encompasses all subject areas for electricians, plumbers, carpenters, and masons. The project should be very basic and not become a permanent structure. Examples of projects allowed for this phase would be wood footing-supported maintenance sheds constructed by a vertical company and equipment operator training for a horizontal company.

Once the company has designs and an initial BOM, the project packet should be submitted to the battalion, which will evaluate and critique the packet and allow the company to move on to the construction portion of this phase. When the project packet is approved, the company will order, track, inventory, and store its BOM. When construction begins, the company will inspect and evaluate individual Soldiers through quality control (QC) personnel, using the same evaluation criteria as the STPs. The battalion will use the completed evaluation to track the project and coordinate with DPW to inspect it with QC personnel. The 92d Engineer Battalion has employed these QC steps successfully and found that DPW has been very willing to provide additional training to our Soldiers. As the QC personnel evaluate Soldiers and their individual tasks, the battalion will evaluate the company QC personnel and how they inspect the job sites. The battalion will also use the evaluation criteria found in the STPs for the construction engineering supervisor (MOS 21H) and construction equipment supervisor (MOS 21N). As quality assurance inspectors, the battalion also inspects the company projects. This allows the battalion to oversee evaluations by the QC personnel and also evaluate the overall company command and control of the project. After the construction portion of this phase is complete, the project will undergo prefinal and final inspections and typical close-out procedures by the companies while the battalion is evaluating.

Military surveyors receive a class on soil analysis during Table I training.

Soldiers from the 92d Engineer Battalion lay the first course of a concrete masonry unit wall.

Table III. Table III, the *run* phase, is the culminating training event in which companies will design and construct their own capstone project. The project will be larger than the Table II project and will have an outside agency as the customer. Since there is an actual customer, all initial designs and project packets will be synchronized with the battalion and the company. Once the project packet is complete, it will be sent to the customer for approval. Due to the typical six-month waiting time that DPW and the Directorate of Contracting require for all projects, the project packet must be submitted during the first phase. This will require the battalion-level construction officer to do all initial planning and coordination with the customer at the start. Once the company reaches the third table, then in-progress reviews between battalion and company will begin and the company will plan the actual project packet.

Timeline

The timeline for this type of training is spread throughout the year. The training will be biannual, with the first qualification tables starting in Month One and ending in Month Six. Table I will take place at the beginning of the course and will typically take a month to complete. This leaves five months to complete the small and capstone projects during Tables II and III. Performance of Table II will determine if Table III can actually be accomplished. If the company's Soldiers are ahead of schedule during Table II and appear to be retaining their STP skills, then the battalion may allow the company to continue on to Table III once Table II is complete. On the other hand, if the Soldiers are falling behind and not retaining their STP skills, Table III can be cancelled and Table II extended to the end of the six-month period. Once that period is up, the

A Soldier uses a D7 bulldozer to push-load a scraper.

Carpenters train on their skill level one tasks.

company can start over and begin the second iteration of Tables I through III. This will allow for all the Soldier and leader transitions during that six-month period.

Potential Challenges

The most significant uncertainty for this proposal is how well it will match up with units' training calendars. Each unit must compare and synchronize its long-range training calendar and balance out its construction tasks with common Soldier tasks. Another challenge may arise if the customer approval process for the capstone project starts in Month One, which will leave little flexibility in the timeline in case a company does not pass the battalion evaluations for each table. In that case, a company could delay its capstone project (Table III) and use that time slot to continue working on Table II. The only coordination needed for this postponement would be to inform the outside agency sponsoring the capstone project.

Another consideration is the budget, time schedule, and agenda of the DPW or other outside agency. DPW's budget and time schedule may conflict with the battalion's training calendar. Past projects have shown that the time between the planning and construction phases varies widely due to the unpredictable processes that all BOM and project approval requests must undergo. Since there is no definite timeline for these processes, it will be difficult for the battalion to define the training timeline for the projects and to synchronize DPW's calendar with its own. To prevent lost training time, all BOM and project approval requests will be approved three months before any construction begins (Table III). These approvals from DPW will be one of the decision points that will determine if the companies will reach Table III. This will eliminate any undefined variations in the timeline between the planning process and the construction phase. Having the project approved and the BOM awarded before the construction phase will allow the companies to create a more accurate critical path method and synchronize that timeline between DPW and the battalion.

Conclusion

The little training time most construction units have between deployments is valuable and should be used to its fullest potential. Simply assigning construction projects to subordinate units does not teach Soldiers the fundamentals of construction. That is why there should be a redundant teaching system that starts with the fundamentals of construction. Soldiers start with the basics and learn straight from the STPs and FMs. Once Soldiers pass the first table, they will use what they have learned and apply it first to a small-scale project and eventually to their capstone project. This article proposes to overlap lessons that teach Soldiers their individual construction tasks because redundancy is the best way to reinforce training. The overlap also helps train new Soldiers and newly promoted noncommissioned officers (NCOs). Soldiers and NCOs who might have missed a previous table will be accounted for during the next six-month training cycle. This proposal is one way the Engineer Regiment can ensure that construction units are properly trained on basic skill sets and can execute projects in a variety of circumstances.

Captain Kondo is the 92d Engineer Battalion construction officer. He attended the United States Military Academy at West Point, New York, and holds a bachelor's in civil engineering.

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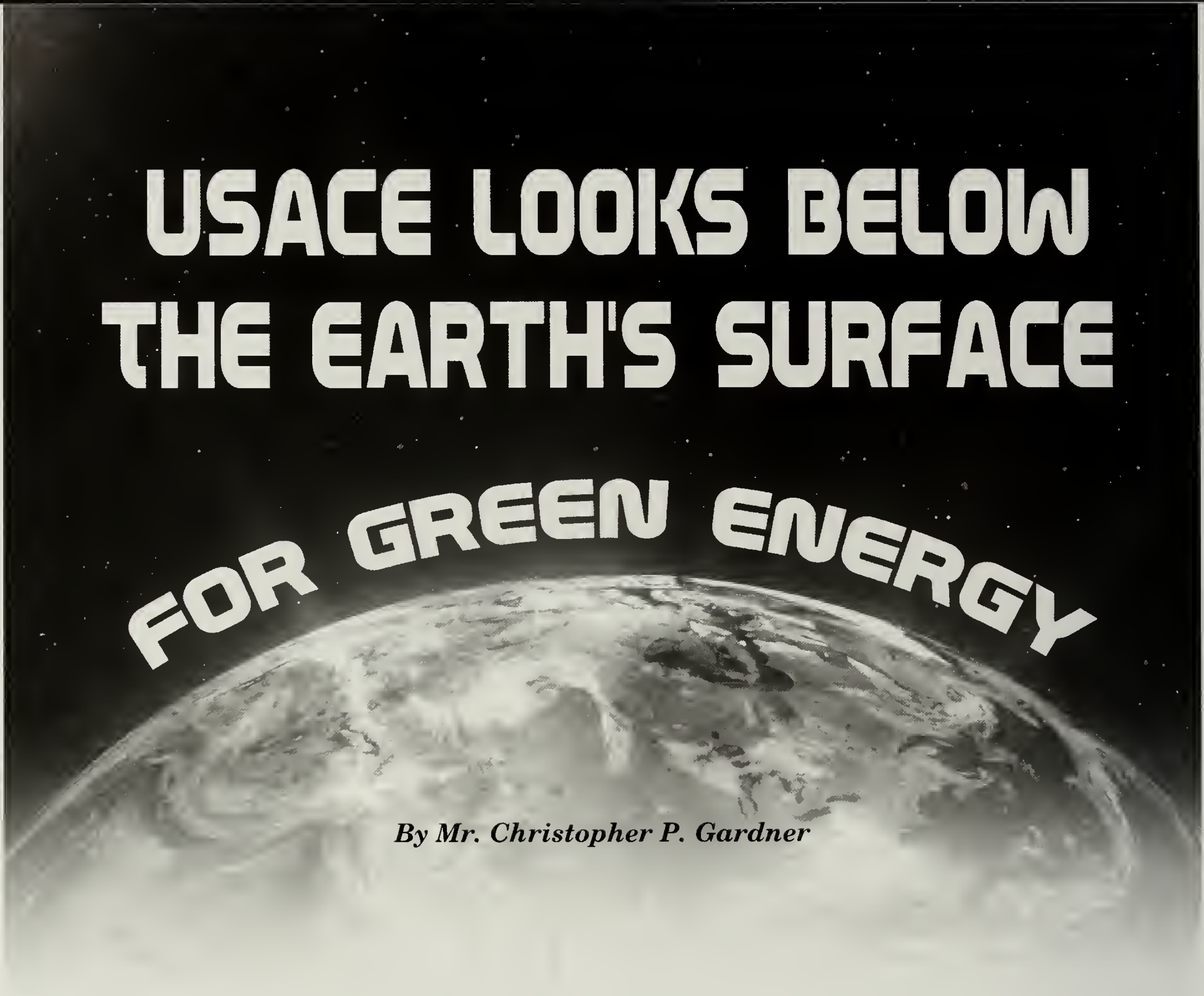
USACE LOOKS BELOW THE EARTH'S SURFACE FOR GREEN ENERGY



By Mr. Christopher P. Gardner

With construction booming around Fort Drum, New York, and the Army looking for more ways to "green" its construction practices and buildings, the Fort Drum Program Office of the United States Army Corps of Engineers (USACE) New York District decided to look into alternative sustainable energy sources for new construction. One of these alternatives was geothermal energy.

Renewable Energy Source

The Corps first started using geothermal systems at Fort Drum in 2004 for the construction of the Wheeler-Sack Army Airfield Complex. These systems provide a renewable source of energy for heating and cooling buildings. The temperature below the earth's surface remains nearly constant between 50 and 60 degrees Fahrenheit. Geothermal systems consist of a network of pipes filled with liquid buried in the ground; this acts as a heat exchanger to transfer energy to and from the building. Geothermal heat pump systems provide temperature control inside buildings without the burning of fossil fuels that occurs in traditional systems.

Use of these systems exceeds the standards for military energy requirements and reduces utility costs for Fort Drum, according to the New York District's program manager. In these facilities, the heating and cooling work similar to that in traditional systems. Occupants can adjust the temperature on a room-by-room basis, and the installation can adjust the temperature from a central location.

Beyond the Barracks Projects

During the initial design of the Wheeler-Sack Army Airfield Complex in 2002, engineers from the Fort Drum Program Office met with the local Indian River School District, which incorporated a geothermal system into one of its large building additions. The engineers toured the facility and talked to the users and the design firm to get a better idea of the system operation and performance capabilities.

After learning more about the concept, visiting other facilities that used geothermal approaches, and getting a better understanding of the specifics of geothermal design, the program office was ready to incorporate it into the designs and contract language of the barracks portion of the Wheeler-Sack Army Airfield Complex being solicited. The barracks were two of 17 buildings in a $100 million complex that was completed in 2006. The project manager at the Fort Drum Program Office reports that they were pleased with the end result of the project, and a bit surprised at how well the geothermal systems worked in the minus-20-degree

Photo by Dan Desmet, New York District public affairs

Crews work on trenches for geothermal wells, part of the heating and cooling system at the Fort Drum, New York, child development center.

temperatures. A survey of the residents in the Wheeler-Sack barracks yielded positive responses from all.

Based on the success with geothermal systems in barracks projects from 2004 through 2008, the Fort Drum Program Office is now providing geothermal energy as a primary option for heating and cooling needs in all new construction, where feasible. (Geothermal doesn't lend itself to large open-area buildings—such as hangars and vehicle maintenance facilities—where instead the Corps uses a green feature called "solar walls.") Projects that support geothermal heating and cooling range from barracks facilities to administrative buildings. Although there were concerns during the design phase in 2003 that geothermal methods would not work for Fort Drum applications due to the harsh winters, the Wheeler-Sack barracks project is proof that the systems do work there.

A child development center that is now under construction incorporates a geothermal heating and cooling system. The facility is designed to be Fort Drum's first Leadership in Energy and Environmental Design (LEED) Gold building. (The LEED rating system—with its four point-system levels of Certified, Silver, Gold, and Platinum—has created a framework encompassing building

Photo by Dan Desmet, New York District public affairs

Pipes are installed as part of geothermal wells during construction of the Fort Drum child development center.

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WARRIOR IN TRANSITION COMPLEX: GROWING IN PHASES

By Mr. Christopher P. Gardner

The United States Army Corps of Engineers (USACE) New York District recently completed construction of barracks and adjoining administrative facilities for the 385th Infantry Battalion at Fort Drum, but the job was different from other barracks projects that are springing up as the installation continues to grow. The 385th is one of the Army's Warrior in Transition (WIT) units—a relatively new concept for the Army. The units are made up of wounded Soldiers and are geared toward helping them make the transition back to traditional Army units or into civilian lives.

The 144-Soldier barracks is only one part of the new $35.7 million WIT Complex, a phased project that is capable of expanding to seven facilities. The complex also includes a new company operations facility, where medical and personal services are available and where WIT commanders can manage their Soldiers' intricate and often long transition processes in one place. Connected to the Soldiers' housing, the facility serves as a kind of nerve center for their healing. After the contract for the WIT complex was awarded in July 2008, Phase I of the project was completed 18 months later, in mid-February 2010, and the Soldiers moved into the barracks on 10 April 2010.

The 385th's Alpha Company has approximately 125 Soldiers, and their company commander notes that having everyone connected under one roof is a significant improvement. Many of the Soldiers, whether having suffered physical or psychological wounds—or both—have a litany of doctor and physical therapy appointments, counseling sessions, and other meetings required to prepare them

Photo by Dan Desmet, New York District public affairs for the next steps in their lives. Many of these resources used to be spread all over the installation or even farther away. Now, case managers, nurses, social workers, counselors, and Army leadership are within walking distance of the housing—and Fort Drum's Guthrie Ambulatory Health Care Facility is across the street from the complex. A Purple Heart recipient who was injured in an improvised explosive device (IED) blast in Afghanistan, and who recently moved into the WIT barracks, stated that the improved access obviates the need to drive Soldiers who can't get around to their appointments. Additionally, having the Army leadership nearby is "a lot easier."

Just as the facility offers Soldiers many services to help them with their healing and transition back toward more traditional units—since the ultimate goal is to return Soldiers to duty—there are also resources for transitioning back into the civilian world. These resources can include helping Soldiers with career services, exploring educational opportunities, and determining what kinds of support Soldiers will need after they leave the Army. At the adjoining administrative building in the complex, education counselors guide those looking for colleges—such as one Soldier in the 385th who was injured while training for deployment and now wants to become a police officer.

The WIT barracks building appears similar to others from the outside, but on the inside the rooms are designed to be more comfortable for the transitioning Soldiers as they heal. The living quarters and kitchenette areas are larger and offer the Soldiers more privacy than in traditional barracks facilities. The size is comparable to a small apartment, with a personal side and doors to each room. The rooms offer more than comfort though, as they are not quite uniform throughout the barracks, and certain rooms are Americans with Disabilities Act (ADA)-compatible: They have unique features like adjustable-height stoves and countertops and/or specialized bathroom facilities that can be especially helpful for Soldiers with physical injuries. Here, a Soldier can be assigned the best room for his or her unique situation.

Photo by Dan Desmet, New York District public affairs

A sheltered walkway connects the Warrior in Transition barracks to important services, such as counseling and command leadership.

The three-story barracks is also equipped with elevators—including special oversize ones—and "areas of rescue," which are designated spots near exits where people with disabilities can remain temporarily in safety during emergency situations while awaiting further instruction. Neither the larger elevators nor the areas of rescue are standard for an Army barracks.

The Warrior in Transition Complex at Fort Drum, New York, located next to the Guthrie Ambulatory Health Care Facility, is composed of special barracks facilities for wounded warriors and adjoins the Company Operations Facility.

Photo by Dan Desmet, New York District public affairs

This geothermal system is inside the barracks in the new Warrior in Transition Complex at Fort Drum, New York.

The WIT Complex at Fort Drum was one of the first of its kind in the Army to open up to Soldiers; presently, the only other completed facility like it is at Fort Riley, Kansas. There are WIT units elsewhere throughout the Army, and other installations are already regarding the Fort Drum facility as an example. The USACE Center of Standardization is proud of how well the facilities turned out and recently brought two WIT unit company commanders from Fort Belvoir, Virginia, to visit the Fort Drum complex—with personnel from the USACE Baltimore District and an architect from the next WIT facility at Fort Belvoir—to learn what went into its planning, design, and construction.

The WIT Complex Phase I project is completely finished, but the complex is slated to continue growing immediately as part of WIT Phase II, which consists of a battalion headquarters facility, a Soldier and family care facility, and 48 additional rooms for Soldiers. During the next few years, there are also plans for additional housing, administrative facilities, a clinic, and a potential dining facility. The way the WIT Complex is designed to grow in phases—with structural additions having minimal effects on current occupants and the site—will benefit Soldiers, minimize impact to the environment, and provide savings to the government.

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"Green Energy," continued from page 39)

performance and sustainability goals.) The $6 million child development center is essentially the Army's equivalent of a daycare center. The facility will be approximately 17,000 square feet, and contractors have drilled 16 wells to handle the facility's heating and cooling needs. The wells are approximately 425 feet deep and took about a week to drill. The depths of the geothermal wells will vary throughout the installation, depending on the geology and thermal conductivity of the area.

Using geothermal energy lowers energy costs by reducing the amount of fossil fuels burned—which can be considerable during Fort Drum's extreme winters, where temperatures can reach well below zero and have been known to reach the negative thirties. The geothermal system performs very well, even in the cold, but the project manager stressed that in the most extreme temperatures, the system sometimes needs a boost from traditional heating sources.

Despite geothermal energy's cost during the construction phase of approximately 30 percent more than traditional heating and cooling systems, the New York District's program manager pointed out that "payback"—the time it takes for a facility to recoup that initial cost with money saved in utilities—is generally three to seven years. The payback time depends on the building size and the fluctuating cost of fossil fuels—the latter having shortened the estimated payback time in recent years. The program office is looking into monitoring systems to determine the specific return on investment of geothermal energy at Fort Drum.

Energy Progress at Fort Drum

Geothermal energy has been used, where feasible, during the construction of facilities since 2004. As of today, geothermal systems have been incorporated into 19 buildings currently completed, under construction, or under design at Fort Drum. This includes the aforementioned child development center, 11 barracks buildings, a brigade and a battalion headquarters building, and the addition to the Guthrie Ambulatory Health Care Clinic. Geothermal energy was also used in the recently completed Warrior in Transition Complex constructed for injured Soldiers (see article on page 40) and will be included in the next two facilities to be added to this complex.

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Past in Review

Captain George G. Meade and the United States Lake Survey

By Mr. Gustav J. Person

The five Great Lakes—Superior, Michigan, Huron, Erie, and Ontario—comprise one of our greatest natural wonders. Their six quadrillion gallons of water are spread over 94,500 square miles, and their connecting waterways form the world's largest inland water transportation system. From the westernmost port at Duluth, Minnesota, a ship can travel 1,160 miles to the St. Lawrence River and 2,340 miles to the Atlantic Ocean.[1]

Founded in 1841, the United States Lake Survey was undertaken as a hydrographic study to chart the inland seas and make them conducive to trade and development. One of the foremost commanders of this survey was Captain George Gordon Meade, an officer of the Corps of Topographical Engineers. Meade is usually widely recognized for his later role as the victor of the Battle of Gettysburg in 1863 and as commanding general of the Army of the Potomac during the Civil War. This article will examine Meade's early role in the survey, both in advancing scientific research and developing the national economy and defining civil/military relationships at the beginning of the Civil War.

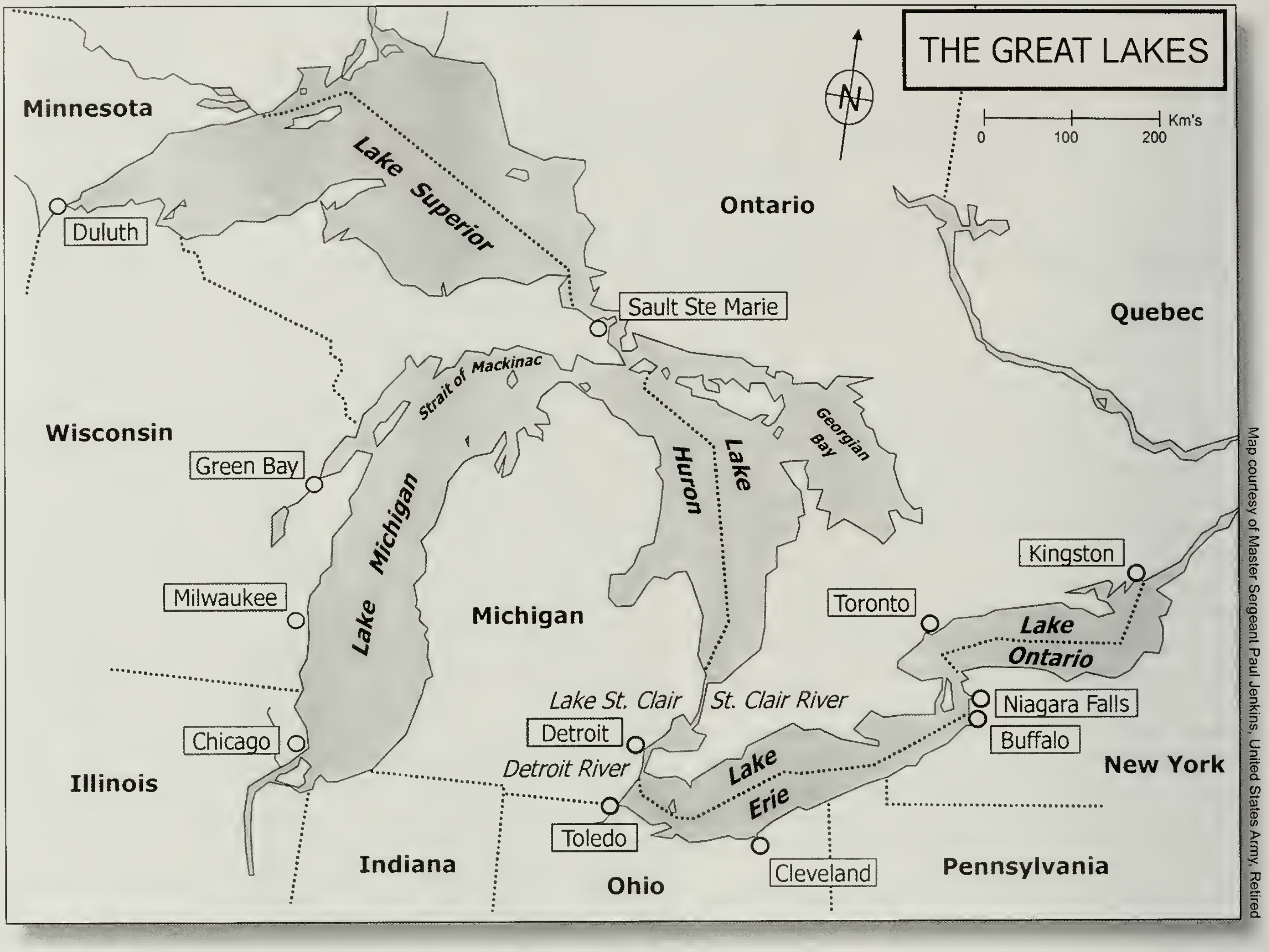
George G. Meade

George G. Meade was born in Cadiz, Spain, on 31 December 1815. His father, a wealthy American merchant, was financially ruined by his adherence to the cause of Spain during the Napoleonic Wars. After obtaining an appointment to the United States Military Academy at West Point from a Pennsylvania member of Congress, he graduated in 1835, ranking 19th in a class of 56 members. Meade's original branch was artillery, in which he served in Florida during the Seminole Wars. Resigning in 1836 along with many other young officers, he pursued a short career in civil engineering but reentered the Army in 1842 as a second lieutenant in the Corps of Topographical Engineers. During the Mexican War (1846–48), he served at the battles of Palo Alto, Resaca de la Palma, and Monterey and was awarded the brevet of first lieutenant. Thereafter, he was mostly engaged in lighthouse construction in Florida, New Jersey, and Delaware, in the Fourth and Seventh Districts respectively.[2]

Photo courtesy of Office of History, United States Army Corps of Engineers

Less than a decade after his work on the United States Lake Survey, Captain George G. Meade was Major General Meade, hero of Gettysburg.

In April 1856, at age 41, Lieutenant Meade received a transfer from coastal duty and was sent to Detroit to assist in the ongoing survey of the Great Lakes. In May 1857, he was promoted to captain and placed in command of the



Map courtesy of Master Sergeant Paul Jenkins, United States Army, Retired

Map of the Great Lakes

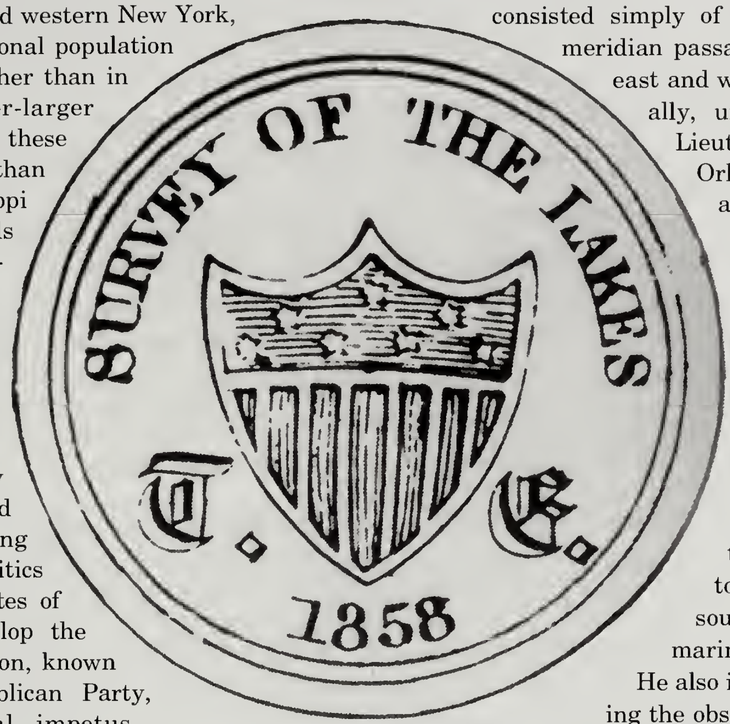
survey, replacing Lieutenant Colonel James Kearney, who was reassigned due to ill health. Meade's official title was *Superintendent* (or *Superintending*) *Engineer, Survey of the Northern & Northwestern Lakes*. The process entailed mapping the lake shores and navigation hazards; charting the lake bottoms to locate hidden dangers; and mapping projected ship channels. The duty included improvements of existing harbors, as well as searching for potential sites that could be converted into harbors in time of war. Sites for lighthouses, beacons, and buoys also had to be located. The work was daunting. Some 6,000 miles of shoreline were to be surveyed. The Army surveyors had to determine latitude and longitude; measure the discharge of rivers into the lakes; and survey tributary rivers, narrows, and shoals.[3]

Great Lakes Economy

With characteristically broad vision, Colonel John J. Abert (1786–1863), the first Chief of Topographical Engineers, described the survey in the most far-reaching terms. "These lakes," he wrote, "constitute a great northern seaboard." At almost every turn, he urged Congress to provide more money, buttressing his arguments for increased support by reminding the legislators of the thriving lake trade and backing his claims with the commercial statistics that he required of his engineers in the field.[4]

In the 1820s and 1830s, the economy of the Great Lakes region made tremendous gains, leading to the need for a comprehensive survey. Congressman Joshua Giddings of Ohio had witnessed the beginnings of trade on the lakes during this period. During the 1840s, he called on fellow lawmakers to recognize the greatly expanded trade and provide for harbor improvement. He noted that trade on these waterways amounted to more than $65 million in 1841 and more than $100 million in 1844. Chicago's Democratic congressman, John Wentworth, remarked in 1846 that "the commerce on the lakes the past season has been $125,000,000, employing 6,000 active seamen. The large amount of lake commerce (import/export) will be best appreciated when it is known that the whole export commerce of the United States is but $114,000.000." The Erie Canal, completed in 1825, already served as the linchpin for the new system of trade, tying the Great Lakes into New York City and the Northeast. Lake representatives demanded that the government create "harbors of refuge" for vessels caught in the violent storms that often swept across the inland seas.

The development of the lakes considerably reoriented the economy of the Midwest. Reflecting the influx of settlers from New England and western New York, more and more of the regional population lived around the lakes rather than in the Ohio Valley. An ever-larger portion of shipments from these states flowed east rather than south down the Mississippi River. Finally, the demands of Great Lakes congressmen for government improvement outlays led to a realignment of Northern voters. The new patterns of trade weakened old political alliances and formed a new, purely Northern party that joined together two overlapping groups: the strongest critics of slavery and the advocates of federal programs to develop the North. The new organization, known after 1854 as the Republican Party, would provide additional impetus toward the outbreak of the Civil War.[5]



Seal of the Survey of the Lakes, 1858

Meade's Accomplishments

Although Army engineers conducted surveys as early as 1833 and during the period 1836–37, the systematic surveying was not begun until 1841. In that year, Captain William G. Williams, then stationed at Buffalo in charge of harbor improvements on Lake Erie, received directions from Colonel Abert to start the survey of the Great Lakes. Into this ever-expanding and potentially explosive political situation, George Meade arrived with his family at the Detroit headquarters of the United States Lake Survey in 1856. He came well prepared for this role. He had the comprehensive mental grasp of the country that makes a born surveyor and which must have been apparent to everyone associated with him. His principal accomplishment was the survey of the whole of Lake Huron during the 1857–59 seasons and completion of the survey of Saginaw Bay. Lieutenant Colonel Cyrus Comstock, one of Meade's successors as commander of the survey and a future commandant of the United States Army Engineer School (1886–87), noted that "the nature of the field operations required a combination of triangulation and astronomical work for the determinations of the positions of points on the shores of Lake Huron, and [Meade] made some changes necessary in the method of executing the off-shore hydrography." He also noted that Meade determined the general configuration of the bottom of that lake by running a few lines completely across it.[6]

Undoubtedly, the most notable method Meade adopted for the survey was a modification of the procedure to determine longitudes by the use of the electric telegraph, known as the American method. This procedure, invented by Professor C.A. Young of Western Reserve College in Ohio, consisted simply of observing and timing the meridian passage of stars at two stations east and west of each other. Additionally, under Meade's supervision, Lieutenants C.N. Turnbull and Orlando Poe did considerable astronomical work, and Lieutenant William P. Smith performed a good deal of magnetic work. The procurement of state-of-the-art chronometers and other instruments aided these important endeavors.[7]

In 1859, Meade set up 19 weather stations on the five lakes. In addition to gauging the weather, he sought to predict it and warn mariners of impending storms. He also instituted a system for refining the observations made on the force and direction of the wind, after finding that the meteorological authorities had developed no uniform system.[8]

In 1860, the survey of the northeastern end of Lake Michigan was extended southward to include the Fox and Manitou Islands and Grand and Little Traverse Bays. This survey resulted in the publication of a much-needed chart of that dangerous part of Lake Michigan—the route traversed by vessels sailing between the Straits of Mackinac and Chicago. The Lake Survey completed a few local harbor surveys on Lake Superior by 1859 and began a general survey of the western end of that lake in 1861.[9]

From 1858 through 1861, the federal appropriations for the Lake Survey grew to $75,000 annually. The increase permitted expansion of the scope of the survey; introduction of more accurate methods to obtain longitude; and commencement of a series of magnetic and meteorological observations, as described above. In addition, these appropriations provided funds for the construction of an astronomical observatory at Detroit and, after 1858, for the first systematic recording of lake water levels.[10]

Meade would later write that he considered the early work on coastal lighthouses and the lakes survey as among the most important duties of his extensive career. However, he had watched with great anxiety the stresses that were beginning to tear the nation apart in the late 1850s. He scanned the political horizon for some glimmer of hope that the dreaded resort to hostilities might be averted. Therefore, in the presidential election of November 1860, he cast his vote for John Bell and Edward Everett of the new Constitutional Union Party, a compromise group that attempted to sway conservative voters who opposed both the Republicans

Photo courtesy of Office of History, United States Army Corps of Engineers

Colonel James D. Graham

and the Democrats. Abraham Lincoln, with only 40 percent of the popular vote, won enough electoral votes to win the presidency. The secession of the Deep South states followed soon thereafter.[11]

Civil War

In the strongest language, Meade denounced the Southern leaders who were goading their people into civil war. He knew of the immense superiority of the North over the South in human and materiel resources, and of the contempt of the South for the North. In Detroit, as elsewhere, there was intense political excitement, and one of its manifestations was distrust of many officers of the Army and Navy—a number of whom had resigned their commissions to side with the Confederacy. In the midst of the uproar, a proclamation in Detroit requested the presence of military officers at a mass meeting in order that they might take the oath of allegiance to the United States. Captain Meade was having none of this. His officers met at his home and, with one exception, declined to attend the mass meeting. As justification, they claimed that it was unbecoming of officers in government service to be present at such a meeting, especially for such a purpose; that it would set a dangerous precedent for officers to take an oath at the demand of a crowd; and that the organizers of the meeting were unjustified in making such a demand. They then drew up, signed, and forwarded a statement of their willingness to take the oath of allegiance whenever called upon by the War Department.

The action of these officers in declining to attend caused a great deal of violent language from the public at the mass meeting, which dispersed after the usual patriotic speeches and resolutions. Nothing of consequence came of the affair, although it generated some suspicion and ill will among some prominent people in that part of the country.

Soon after the firing on Fort Sumter on 12 April 1861, Captain Meade made urgent and repeated requests to the War Department for active duty. With no response, he went to Washington in late June. He protested against being retained in charge of the Lake Survey and applied for a commission in one of the new regiments being raised to put down the rebellion. Unfortunately, nothing came of it and he returned to Detroit empty-handed. Meanwhile, he had been placed in charge of the erection of new lighthouses on Lake Superior. All of the younger officers under his command had already been ordered to active duty and were engaged in raising and organizing new volunteer units.

In early August, he was ordered to turn over his duties to Colonel James D. Graham—at age 77, one of the oldest topographical officers—and to return to Washington to take charge of the recruitment of a company of topographical engineers, lately authorized by Congress. Meade was much dismayed by the situation in which engineer officers, agreeing or ordered to continue their own corps duties, were left behind in junior rank, while others were rapidly being advanced to field and general officer grades in the volunteer service. This dismay had led to his determination to resign his Regular Army commission in order to accept the colonelcy of one of the regiments of Michigan volunteers, a post which had been offered to him by Governor Austin Blair. However, much to his surprise and gratification, he was officially notified of his appointment, on 31 August 1861, as a brigadier general of volunteers with orders to report to Major General George B. McClellan, then commanding the Union forces around Washington, D.C. He hurriedly sent his family back to Philadelphia and hastened to the capital, where he was assigned as a brigade commander in the division of Pennsylvania troops commanded by Major General George A. McCall. As the world knows, his later record of service in the Civil War was decidedly distinguished.[12]

Epilogue

In Meade's absence, Colonel Graham, and later Lieutenant Colonel William F. Raynolds, supervised the Lake Survey. Both officers would continue and capitalize on Meade's excellent work. Due to active operations during the Civil War, the survey was the only active topographical field office still operating, although only the survey of

(Continued on page 49)

Investigations—Part I:

Why Official Inquiries Are Needed

By Captain Daniel D. Maurer

This is the first of a two-part discussion of why an official investigation is often helpful to the Soldier, the unit, and the United States Army, and how this useful tool can best be conducted.

This two-part article is designed for two audiences: the commander who is wary of intrusive or distracting investigations that lack a positive goal; and the leader who is likely to be tagged as a unit's next investigating officer and who may not have any relevant experience investigating. It will delve into why it is almost always in the best interests of the Soldier, the unit, and the Army to investigate when a commander asks, "How did this happen?" and the answer is, "We don't exactly know."

Part II, to be published in the January–April 2011 issue, will focus on the mechanics and tactics, techniques, and procedures for executing lawful, thorough, and productive investigations. Like an engineer route sanitization mission, these two parts will push away some of the debris of misconceptions and obstacles to good detective work, fill in the potholes of poor execution with sound procedures, and give commanders and investigating officers some advice for traveling the road to executing legally sufficient and helpful investigations.

Balancing Act

Commanders often struggle to balance their focus between accomplishing the mission and maintaining good order and discipline among their formations. Of course, as all experienced leaders can attest, the one often affects the other. This balancing act is even more accented during a deployment, where there is little distinction between Soldiers' living and working environments. Tensions and stress levels are high, and the availability of "down time" is sometimes scarce. In such conditions, spending time and energy to question and answer nagging problems may not sit at the top of the priority list.[1] But the absence of clear and fair processes to deal with the nagging disciplinary problems that frequently arise may only serve to exacerbate small issues, turning them into large crises. These crises are often attributable to an earlier failure to deal with the problem. Consequently, the command's attention is drawn away from operations, which may result in a degraded ability to accomplish the mission. In other situations, misconduct is less a concern than a systemic failure in leadership, training, maintenance, or elsewhere. In all of these cases, it is imperative that the method of uncovering facts and making recommendations—how problems are investigated—is rational, reasonable, and internally cogent. This ensures that—

- The Soldiers' rights are protected.
- The right evidence is collected for the right reasons and in the right way.
- The chain of command is put in the best possible position to make sound decisions.

But before we get to *how* we investigate, it is equally important to know *why* we investigate.

Why We Investigate

Under Rule 303 of the Manual for Courts-Martial United States,[2] commanders are authorized to commit time and effort to investigating misconduct. It is a basic application of command authority to ensure the good order and discipline of the unit. The gist of this authority is the ability of the immediate commander, who has direct contact with and knowledge about a particular Soldier, to ask relevant questions to jump-start a more formal investigation or help drive an efficient and effective decision. Asking questions might take the shape of an investigation under Army Regulation (AR) 15-6, *Procedures for Investigating Officers and Boards of Officers*[3]; a formal Criminal Investigation Division inquiry driven by law enforcement specialists; or an immediate administrative response by the commander.

Of course, not all fact-finding efforts are about criminal misconduct, but fact-finding inquiries are permitted or even encouraged, even if the event or incident in question is not likely to lead to a court-martial. Consider a scenario in which a commander reasonably predicts that a vehicle accident "outside the wire" between a mine-resistant, ambush-protected (MRAP) vehicle and a pickup truck driven by a local national civilian was caused by poor road conditions or driver fatigue. The commander may be inclined to order a response plan that includes nothing more than retraining, better route reconnaissance, and confirmation of crew rest. However, during the course of the inquiry or investigation, the commander may learn that the Soldier's fatigue was caused by his reckless choice to remain awake playing video games in his containerized housing unit (CHU) until 0430 on the day of the patrol. Or that the unit's patrol leader knew of a dangerous, accident-prone intersection on the planned route, yet never warned his Soldiers or trained them on mitigating that risk. In this case, the commander may want to consider adverse actions. The opposite scenario is equally plausible. The Soldier's actions may be labeled as misconduct at first, until investigation reveals that environmental factors or leadership failures set conditions for the accident. Every investigation has a potential for legal consequences and is therefore triggered by the body of law that governs military justice.

Since this potential exists in all investigations, it makes sense to give quasi-law enforcement authority to commanders before they engage their quasi-prosecutorial powers. Because of the unique environment in which the United States Army works and lives, efficiency—balanced against fairness of process—is essential to the promotion of justice in the functioning of a disciplined, ordered unit. In other words, there are situations—sometimes as a unique attribute of military service such as minor disrespect or failure to obey a lawful order while living in the barracks—wherein the commander can gather facts, review and reflect on them, draw reasonable conclusions from them, and dispose of the incident with some administrative or punitive consequence.

Sending a Positive Message

Sometimes, in an information-operations or public relations sense, commanders may find great utility in starting an investigation. There is a "strategic messaging" value to be gained when Soldiers, their families, the public, or superior commander see that the unit recognizes that an issue exists and takes reasonable steps to understand why. By initiating an investigation, a commander can counter the fear that "airing dirty laundry" somehow opens the unit to outside criticism. Telling superiors that an issue exists and what actions are being taken to investigate it and proposing reasonable and deliberate courses of action demonstrate the commander's depth of situational awareness, thoroughness of fact-finding, and calm maturity as a leader.

Sometimes, though, commanders will not have a choice. Many commands impose mandatory investigations for certain events, such as an AR 15-6 investigation for the suspected suicide of a Soldier. Formal equal opportunity complaints automatically spark investigations.[4] In these cases, the value gained by conducting a dignified, independent, official review of the facts to satisfy the concerns of interests such as the media, families, and fellow Soldiers is thought to outweigh the potentially negative effect such an investigation might have on the operational capability of the command.

Keeping Commanders Grounded

"Commanding officers exercise broad disciplinary powers in furtherance of their command responsibilities. Discretion, fairness, and sound judgment are essential ingredients of military justice."[5] Slowing down, pausing to reflect, and initiating an investigation is a field-tested and field-proven method for ensuring that a commander's first, visceral response to a troubling event is not some irrational or irresponsible action that could potentially end the career of a Soldier, seriously hinder promotion opportunity, take away pay, or rob a Soldier of liberty through confinement in prison. An investigation is one of the checks and balances on the commander's inherent disciplinary authority and helps ensure that the application of power is "warranted, appropriate, and fair."[6]

Resourcing an investigation early to immediately address incidents, when evidence and memories are fresh, allows the commander to make better-informed and relevant decisions. In contrast, waiting to investigate may seriously narrow options later on. Consider a verbal dispute between Soldiers in their shared CHU, where one has an M4 rifle loaded with a magazine. The platoon sergeant, upon breaking up the argument, sees the weapon and concludes that the rifle's owner intended to threaten his roommate and so launches a chain of events that lead to an Article 15. The commander may find that if an inquiry had started as soon as credible information surfaced, it would have revealed that the argument between the roommates started when one entered the room, saw his despondent roommate with a full magazine in his rifle, staring at pictures of his wife, and smelled alcohol on his breath. A reasonable person could believe that this was not an aggressive—or homicidal—threat but the interruption of a potential suicide. Consequently, the command's legal and leadership challenges would be different. Waiting, or choosing not to investigate at all, was tantamount to deliberately avoiding better situational awareness, not to mention losing the chance to act in a way that was most appropriate.

Improving Institutional Memory

Investigations serve purposes and create value in similar ways that after action reviews do. Just as such reviews identify what *actually* happened compared to what *should have* happened and formulate recommendations for improvement, investigations can be thought of as organized lessons-learned libraries for the next command. An investigation gathers information about an event or incident; assembles those facts into a complete picture of what occurred; draws conclusions based on applicable standards, guides, or laws; then proposes recommendations from the lesson of that particular case. When faced with a pressing issue or systemic concern, future commanders can find substantial utility in going back into the records to discover how previous leaders identified and dealt with similar issues or concerns.

Though there are several types of cases that they should refer to professional investigators *(to be discussed in Part II)*, commanders should not be reluctant to exercise their authority to investigate. The military has given commanders the ability and authority to be their own "internal affairs bureau." The difficult choice to trigger an investigation might be eased if a commander's inquiry or AR 15-6 investigation is considered a fact-finding trip led by a neutral observer. Would the unit benefit from a dedicated examination of the problem and a neutral set of recommendations about it? Commanders will consider all the information available and conduct a cost-benefit analysis, but a realistic standard guide could be quite simple. If a superior commander is likely to take an interest in an issue, incident, or event and would probably ask for an analysis of cause and effect—then an official inquiry is probably needed.

However, not every issue, incident, or event needs an expansive AR 15-6 investigation. Part II will look into the mechanics of executing an investigation, from deciding how big the scope ought to be, to planning the investigative mission, to the critical thinking inherent to solid probing and fact-finding.

Captain Maurer serves as the command judge advocate for the 36th Engineer Brigade (Joint Task Force Rugged). Previous assignments include trial counsel for the brigade at Fort Hood, Texas; assistant task force engineer; sapper platoon leader attached to a 4th Infantry Division mechanized infantry task force during Operation Iraqi Freedom; and battalion support platoon leader and supply officer in a mechanized engineer battalion at Fort Carson, Colorado. He holds a bachelor's from James Madison University, where he was Distinguished Military Graduate from the United States Army Reserve Officer Training Corps program, and a law degree from The Ohio State University.

Endnotes

[1] Investigations are not limited to cases of property accountability or possible misconduct. Any systemic problem that could be found on a commander's desk can call for a rational, ordered inquiry with a purpose and scope, gathered for independent scrutiny.

[2] *Manual for Courts-Martial United States*, Rule 303, p. II-19, 2008. "Upon receipt of information that a member of the command is accused or suspected of committing an offense or offenses triable by court-martial, the immediate commander shall make or cause to be made a preliminary inquiry into the charges or suspected offenses."

[3] AR 15-6, *Procedures for Investigating Officers and Boards of Officers*, 2 October 2006.

[4] AR 600-20, *Army Command Policy*, Chapter 6 and Appendix D, 18 March 2008.

[5] Ibid., para. 4-7a.

[6] *Manual for Courts-Martial United States*, Rule 306 (b) Discussion.

"Past in Review," continued from page 46)

Huron was finally completed. The Lake Survey would continue until 3 October 1970, when it was redesignated the Lake Survey Center and officially transferred to the National Oceanic and Atmospheric Administration. It became part of the National Oceanic Survey, the former Coast and Geodetic Survey. The Lake Survey Center was finally phased out in March 1976.[13]

Mr. Person is the installation historian at Fort Belvoir, Virginia. He retired from the New York State Division of Parole after 30 years of service and is a retired lieutenant colonel from the New York Army National Guard. He holds a master's in history from Queens College, City University of New York.

Endnotes

[1] Arthur M. Woodford, *Charting the Inland Seas: A History of the U.S. Lake Survey*, United States Army Corps of Engineers, Detroit District, Detroit, Michigan, 1991, p. 1.

[2] Ezra J. Warner, *Generals in Blue*, Louisiana State University Press, Baton Rouge, Louisiana, 1964, pp. 315-16.

[3] Richard A. Sauers, *Meade: Victor of Gettysburg*, Brassey's, Inc., Washington, D.C., 2003, pp. 11-12; Frank N. Schubert, Martin Reuss, Dale E. Floyd, and Martin K. Gordon, *The Nation Builders; A Sesquicentennial History of the Corps of Topographical Engineers, 1838-1863*, Office of History, United States Army Corps of Engineers, Fort Belvoir, Virginia, 1988, pp. 43-44; Woodford, p. 193.

[4] Schubert et al., p. 44.

[5] Marc Egnal, *Clash of Extremes; The Economic Origins of the Civil War*, Hill and Wang, New York, 2009, pp. 101-22.

[6] "Annual Report of the Bureau of Topographical Engineers," 15 November 1841, in 27th Congress, 2d Session, House Document 2, pp. 146, 167; Henry P. Beers, "A History of the U.S. Topographical Engineers, 1813-1863," Part II, *The Military Engineer*, Volume XXXIV, Number 201, July 1942, pp. 348-49; George Gordon Meade, *The Life and Letters of George Gordon Meade, Major General, United States Army*, Charles Scribner's Sons, New York, New York, 1913, Volume 1, pp. 209-10; C.B. Comstock, "Report Upon the Primary Triangulation of the United States Lake Survey," United States Army Corps of Engineers, Washington, D.C., United States Government Printing Office, 1882, pp. 2-4.

[7] Meade, pp. 211-13.

[8] Schubert et al., pp. 44-45; Isaac R. Pennypacker, *General Meade*, D. Appleton and Company, New York, New York, 1901, p. 20.

[9] Woodford, pp. 37-38.

[10] Ibid., p. 38.

[11] Sauers, p. 12.

[12] Meade, pp. 213-16.

[13] Schubert et al., p. 45; Woodford, pp. 186-89.

ERDC Serves as Summer Home for Cadets

By Ms. Megan Holland

Ten cadets from the United States Military Academy at West Point, New York, found a temporary home in the United States Army Engineer Research and Development Center (ERDC) this summer while on Advanced Individual Academic Development Program assignments. Designed to give students hands-on experience, the assignments include weeks of research, with the cadets expected to create a final product, briefing, or report for West Point. In some cases, a cadet continues to work on the project as an individual study elective course during the following academic year, an option that many of ERDC's cadets chose.

The voluntary program offers many options, such as touring France to sharpen language skills and absorb the culture. ERDC has participated in the program intermittently since 1978, and this year's crop of 10 cadets was the largest yet hosted by the research organization.

Photo by Oscar Reihsmann ACE-IT

A cadet helps an ERDC researcher prepare for an experimental explosion while working with ERDC's Geotechnical and Structures Laboratory.

Photo by David Roberts, ERDC PAO

A cadet works in ERDC's Environmental Laboratory in Vicksburg, Mississippi.

Three of the cadets worked with ERDC's Geotechnical and Structures Laboratory, four with the Environmental Laboratory, and one with the Coastal and Hydraulics Laboratory, all in Vicksburg, Mississippi; two more were assigned to ERDC's Construction Engineering Research Laboratory (CERL) in Champaign, Illinois.

ERDC engineers and scientists mentor the cadets on a variety of diverse projects. One of this year's projects focused on mitigation of improvised explosive device (IED) attacks against Soldiers. The project involved making roads safer by reducing the forces that act on a vehicle during an IED attack, in addition to lowering the insurgents' ability to emplace the explosive devices in the first place. The cadets working on this project tested small-scale models in the Geotechnical and Structures Laboratory centrifuge lab and worked in ERDC's United States Army Corps of Engineers Reachback Operations Center, evaluating the best measures to lessen these risks in-theater and testing software. They also spent time at ERDC's explosives range, testing ERDC-created mitigation measures on quarter- and half-scale models. Their goal was to determine if the measures could make IED blasts survivable by Soldiers.

Another cadet deployed to assist the Environmental Laboratory in response to efforts by the Department of the Interior (DOI) after the Deepwater Horizon oil spill in the Gulf of Mexico. He helped the Environmental Laboratory and the United States Fish and Wildlife Service organize a natural resource damage assessment database to document injury to DOI public trust natural resources. He also helped in beach bird surveys by searching beach segments to collect data on bird populations in areas affected by the spill.

At CERL, a cadet majoring in civil engineering spent the summer researching renewable and alternative energy technologies in Afghanistan, concentrating on the potential to reduce the need for diesel fuel and reduce annual costs by installing a variety of energy-saving measures. He also studied the conversion of waste to energy through gasification, assessing the potential use of a gasifier to reduce the volume of waste while producing enough energy to automate the waste system and/or offset diesel fuel consumption for generators.

Much of the program's success is credited to the ERDC scientists and engineers who act as mentors for the cadets in their assignments. ERDC benefits from the efforts of the talented cadets, and the future leaders in turn learn about the center's important solutions to Army problems.

Ms. Holland is a contract writer for ERDC. She holds a bachelor's in English and writing from Mississippi College. Before working at ERDC, she was a newspaper reporter in Vicksburg, Mississippi.

Mobilizing the National Guard in a Modular Environment

By Major Kevin L. Becar

The modular deployment of United States Army units from different components presents many issues. This article discusses some of the lessons learned by leaders of the 779th Engineer Battalion (Construction), Florida Army National Guard, and its subordinate companies as they deployed to support Operation Iraqi Freedom.

Useful Preparations

React to changes in First United States Army's Commander's Training Tool (CTT) requirements during predeployment training. Any Reserve Component unit that has mobilized recently is intimately familiar with the CTT. With its massive tracking spreadsheet of training requirements to be completed before a unit arrives at its mobilization center, it can be a daunting list of documentation. One of the more significant challenges units face is the continual updating of CTT versions. If a unit begins training with the version in effect at the start of premobilization, it can be disheartening to learn that completed events are now invalid or incomplete because a newer version has taken effect.

Leaders may find it helpful to pursue a "grandfather clause" to remain under the standards of the version they started with, but at a minimum they must stay alert to version changes and the effects they may have on completed training. It would be ideal to immediately migrate to the latest training recommendations coming from in-theater, but once the time-sensitive nature, the complexity, and the

Soldiers of the 115th Engineer Company fabricate an interior truss.

"The more flexible a unit's organization and leadership teams are, the easier it will be for them to react to the many unknown situations encountered in-theater."

sheer size of the premobilization process are factored in, that migration would become very difficult to manage.

Mesh administrative functions with a new higher headquarters. Unity of command is one principle of war that many people believe is violated in today's modular environment. While the principle certainly exists within the deployed battalion, the United States Army National Guard companies from different states that comprise the battalion still have a secondary command relationship with their joint force headquarters and organic battalions back home. This can pose problems at the brigade level, where Active Army companies have different reporting requirements and procedures. The Active Army companies may authorize battlefield promotions that are not available to the National Guard units. Although the brigade may hold Noncommissioned Officer (NCO) Evaluation Report authority over the Active Army companies, the National Guard units may be allowed to report evaluations through their own state systems.

All of this introduces challenges to take into consideration for modular mobilization of units. It is critical for leaders to contact their higher headquarters as soon as possible to find out what requirements will be so that they can come prepared. For example, some of the 779th Engineer Battalion companies closed out Officer Evaluation Reports (OERs) the day before going on active duty. This allowed them to capture performance for the full mobilization on a single evaluation. Companies that did not follow this policy had to close out annual OERs intermittently throughout the deployment, often having to obtain signatures from the rear, which delayed their completion. If the theater headquarters can provide its rating chain requirements, these may be established before a unit's deployment.

The completeness of personnel records for all Soldiers before deployment is also important. Missing information will affect in-theater boards, awards, and many other administrative items. This information must also be updated throughout the deployment in order to be prepared for proper completion of demobilization records that can capture all the updates and additions that Soldiers earned during their combat tour.

Become acquainted with units assigned for deployment. Learning the capabilities, strengths, and weaknesses of attached companies and how they can be mobilized to support the commander's vision is a tough chore. The 779th hosted a conference for its subordinate companies that allowed key leaders from three states to meet each other, laying the groundwork for future operational relationships. The battalion found it most effective to stay on the same calendar for all major milestones. One company even realigned its annual training date and location to conduct the event with the battalion headquarters. After meeting with First Army to conduct a joint assessment, companies from the three different states discussed issues and challenges in order to agree on a strategy for the remainder of premobilization training.

A clevis and chain turn a bucket loader into a device to maneuver Jersey barriers.

This is one of the many ways to use a chain to lift a Jersey barrier, as demonstrated by the 1313th Engineer Company in Mosul, Iraq.

It is also important to begin setting up secure Internet accounts for key leaders before postmobilization training. This allows immediate contact with leaders in-theater to refine the unit's mission rehearsal exercise (MRX) scenario, based on the most relevant information. As units march toward completion of CTT requirements before postmobilization training, they should be planning to arrive at the same mobilization center on or about the same date to conduct the important MRX together. In addition, the mobilization center training schedule can be synchronized for the entire battalion. Agreement on the dates and order of training events, passes, and departure ceremonies is the key to maintaining this synchronization.

Collect situational awareness on the new area of operations before arrival. If a battalion-level predeployment site survey cannot be arranged, a visit to the mobilization center by a key leader from a unit in the future area of operations would be helpful. This representative can share intelligence updates and operational details about the area and answer most questions. This information was invaluable to the 779th and helped refine MRX details and packing lists and satisfy Soldier expectations. Early receipt of the tactical standing operating procedures and policy letters was a great benefit as well.

Learn engineer-specific tactics, techniques, and procedures (TTP) from new units. Despite the challenges, the positive effects of modularity include the opportunity to learn new, more effective TTP from units just attached for deployment. One of the most significant lessons the 779th learned from its attached vertical construction company was the use of prefabrication. Soldiers from the 115th Engineer Company (Vertical), West Virginia Army National Guard, introduced prefabrication during the MRX when they were tasked to construct Southwest Asia huts. Instead of arriving on-site, clearing it, and establishing security for the duration of construction, they remained on the forward operating base (FOB) in relative comfort and safety to prefabricate the shelters. They spent minimal time on travel and work time on-site to quickly erect the prefabricated huts. The concept was perfected during postmobilization training and was highly effective in Iraq. The 115th commander said that minimizing engineer on-site time eases the logistical strain on the supported unit and that prefabrication cuts that time by 30 to 40 percent.

Another great TTP came from the 1313th Engineer Company (Horizontal), Indiana Army National Guard. The company implemented nontraditional methods to maximize the use of heavy engineer equipment to accomplish the mission. The 1313th Soldiers fabricated a replacement bucket loader tooth to maneuver Jersey barriers more quickly. In addition to using excavators, the engineers used front end loaders to fill HESCO Bastion Concertainer® units, which reached heights of 11 to 12 feet. In the absence of a crane, excavators were used to move and set T-Walls® without applying too much stress to the arm. All of these methods were tested and practiced with the necessary risk assessments for maximum potential on-site.

Prepare for cross-functionality and reorganization as the mission dictates. A battalion may not operate with its own organic capabilities for all of its rotation. Engineer battalions may act as "construction effects" or "combat effects" units or a combination of both. In order to provide full spectrum engineer operations in every operational environment, engineer brigade commanders may slice up battalions to share capabilities with each other. The staff of a construction effects battalion may not need to master company-level operations for route clearance, for example, but the staff should become familiar enough with assured mobility missions, procedures, and equipment to exercise command and control over any combat effects units that may be attached to their battalion. The 779th Engineer Battalion added command and control of route clearance missions to its MRX to validate staff proficiency. That effort paid off when the battalion was assigned an Active Army sapper company during its rotation. An experienced sapper NCO acted as liaison in the battalion tactical operations center to foster a close relationship and avoid miscommunications.

In addition to cross-functionality, units will likely need to reorganize their modified table of organization and equipment (MTOE) to meet new and unexpected demands. For example, most units will need to carve out a protective security detail to take the command team outside the wire on battlefield circulations. There will also be FOB details such as gate guard duty to provide. It is strongly advised that units capitalize on overstrength authorizations to help meet these requirements. The 779th was authorized to deploy with 10 percent excess strength, and the additional personnel proved valuable. Staying flexible to these ever-changing demands will allow units to quickly and effectively reorganize their structure to accomplish the mission.

Conclusion

The more flexible a unit's organization and leadership teams are, the easier it will be for them to react to the many unknown situations encountered in-theater. That's not to lessen the importance of a deploying unit arriving with the most relevant information available, especially from its new higher headquarters. Deploying leaders must learn as much as possible about the missions and organizations above, below, and beside them so that they can react most effectively to changes in plans. The Army has always been known for flexibility and adaptability to enemy TTP; deploying leaders can look forward to adding to that legacy during their rotations.

Major Becar is executive officer of the 779th Engineer Battalion. Previous assignments include operations and training officer, 779th Engineer Battalion; executive officer, 153d Finance Battalion; operations and training officer, 220th Finance Group; supply officer, 116th Engineer Battalion (Combat); and commander, Bravo Company, 116th Engineer Battalion. He holds a bachelor's in accounting from The College of Idaho and is a graduate of the United States Army Command and General Staff College, Fort Leavenworth, Kansas. A certified public accountant, he has been a member of the United States Army National Guard for 24 years.

THE ENGINEER WRITER'S GUIDE

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime telephone number.

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Send submissions by e-mail to *<leon.engineer@conus.army.mil>* or on a CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication by other Army professional bulletins.

Photo by SSG Billie Jo Lorius, North Dakota ARNG Public Affairs

NORTH DAKOTA NATIONAL GUARD TRAINS ON NEW BRIDGE EQUIPMENT

By Staff Sergeant Billie Jo Lorius and Mr. William Prokopyk

The North Dakota Army National Guard's 957th Engineer Company (Multirole Bridge) was the first Army unit to train on a new bridge anchorage system in a fully operational scenario. The training took place on the Missouri River, south of Bismarck, during the unit's two-week annual training in June. The Missouri River was selected as an ideal location to test this system because of its width and fast-moving current.

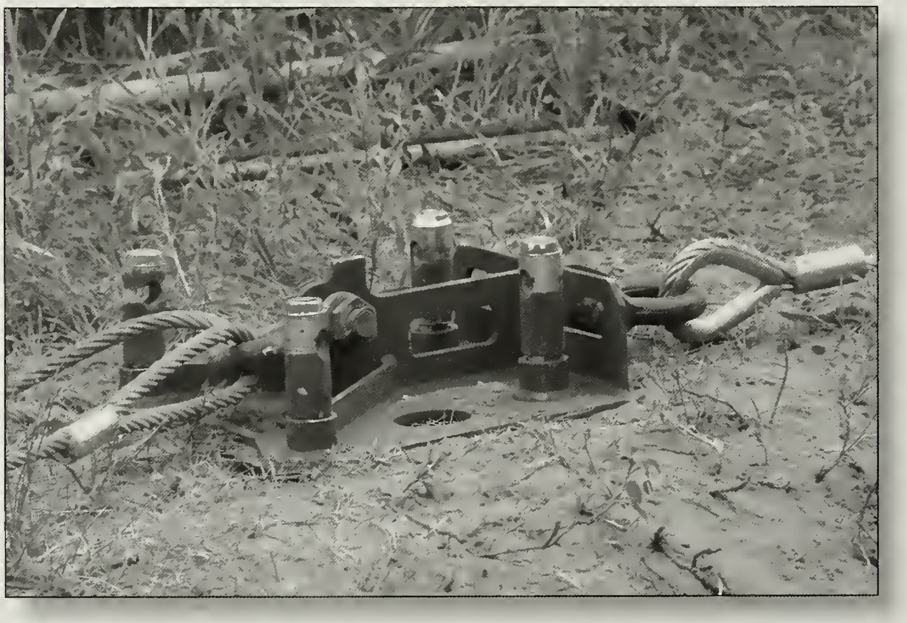

Photo by LTC Rick J. Smith, North Dakota ARNG Public Affairs

This close-up shows the main component of the new "thrust and shore guy" cable system used to anchor the IRB installed on the Missouri River.

The training began with a weeklong 40-hour stretch of classroom instruction on the improved ribbon bridge (IRB), followed by a practical exercise with the equipment and bridge. The 210-meter bridge span was left in place overnight and observed on Friday before the Soldiers and trainers disassembled it. Not only was the 957th training on new equipment, but they were also uniquely part of an important operational assessment of a new anchorage system that has never been used to bridge waters with currents as fast as the Missouri River over a span of 200 meters. Observing the assessment was the North Dakota adjutant general, who said that the Soldiers' feedback will enable program managers to incorporate final adjustments to the anchorage system before final production and distribution to military bridging units.

After the bridge span was emplaced, several tests were performed. First, the forward lateral movement of the bridge was tested by driving a 35-ton common bridge transporter truck across it, loaded with an MKII Bridge Erection Boat (BEB). Crossing at top speed, the truck then performed an emergency "braking stop." During a total of ten crossings, minimal forward movement of the system was observed.

Photo by William Prokopyk, North Dakota Army National Guard Public Affairs

Soldiers of the North Dakota Army National Guard's 957th Engineer Company (Multirole Bridge) secure the improvised ribbon bridge on the Missouri River.

Side deflection of the bridge was also tested. After ten MKII BEBs were attached on the downstream side of the bridge, they applied full reverse-throttle thrust to induce a tremendous side load pull. Little side deflection, shore guy cable movement, or loosing was observed, and only minimal adjustments to the cabling were required. Preliminary observations of these evaluations indicated that this new anchorage system successfully accomplished its designed mission. The 957th and the state of North Dakota—strategically selected for this assessment—played a critical role in determining the system's mission effectiveness and safety.

Following removal of all the equipment, the 957th and the various agencies responsible for evaluating this bridging system conducted a detailed after action review. Suggestions for adjustments and improvements to the hardware—as well as the operational employment and disassembly tactics, techniques, and procedures—were discussed and will be considered for inclusion before final production and delivery to the force. Once deemed ready, the new anchorage system is targeted for immediate movement and delivery to Afghanistan to address urgent warfighter operational needs for improved anchorage capability.

The new "thrust and shore guy" cable system is designed for use with the IRB. It is targeted to fully replace the older "overhead tower system," the 1950s vintage anchorage technologies currently used when employing the older bridge system now in use by the military. The system was designed for the IRB but is desired and targeted for multiple dry- and wet-gap systems. This new anchorage system will be more permanent and is easier and faster to install—which is paramount for Soldiers employing it in warfighter operations. The system was designed by General Dynamics European Land Systems–Germany. Overseeing the event and providing data collection efforts and additional safety oversight were members from various government offices and agencies. Supporting agencies include Product Manager Bridging; Tank-Automotive and Armaments Command (TACOM); TACOM Research, Development and Engineer Center (TARDEC); the Maneuver Support Center of Excellence, and the National Guard Bureau.

Staff Sergeant Lorius is the deputy public information officer for the North Dakota National Guard. She has a bachelor's in English and writing from Dickinson State University and a master's in management from the University of Mary.

Mr. Prokopyk is the strategic communication specialist for the North Dakota National Guard and is retired after nearly 27 years as a United States Army Corps of Engineers officer. He has a bachelor's in civil engineering technology from Youngstown State University and a master's in operational sciences from the Air Force Institute of Technology.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division
Doctrine Branch, Engineer Division

Publication Number	Title	Date	Description (and Current Status)
Recently Published			
ATTP 3-34.80 (FM 3-34.600) (FM 3-34.230)	*Geospatial Engineering*	29 Jul 10	This full revision of FM 3-34.230, *Geospatial Operations*, incorporates changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Published. Obtain from the Army Publishing Directorate or the Reimer Digital Library.
ATTP 3-34.23 (FM 3-34.23) (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	8 Jul 10 (Feb 99) (Jun 95) (Apr 93)	This is a new manual that encompasses engineer operations in support of all engineer operations above the brigade combat teams (BCTs) (division, corps, and theater). It consolidates and has revised three engineer FMs that provided doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. **Status:** Published. Obtain from the Army Publishing Directorate or the Reimer Digital Library.
Currently Under Revision			
FM 3-34	*Engineer Operations*	Pending (Apr 09)	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer disciplines of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Revising manual to incorporate the engineer lines of support framework. Estimated publishing date is 2QFY11.
Combat Engineering			
FM 3-90.4 (*FM 3-34.2) (*FM 3-90.12)	*Combined Arms Mobility Operations*	Pending (Aug 00)	This is a full revision, to include the renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*, and FM 3-90.12, *Combined Arms Gap Crossing*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The Marine Corps is dual-designated on this manual, which will replace their Marine Corps Warfighting Publication (MCWP) 3-19.3, *Marine Air-Ground Task Force (MAGTF) Breaching Operations*. **Status:** To be published 2QFY11.
General Engineering			
TM 3-34.48 1/2 (*FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields and Helipads*	Pending Aug 94 Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Air Force (as well as the Navy and Marine Corps) plans to adopt the new manual also. **Status:** Estimated publishing date is 3QFY11.
TM 3-34.41	*Construction Planning and Estimating*	New	This new manual is being produced by the Navy, in coordination with the Army and Air Force. The manual will provide the TTP and planning factors for conducting construction planning at the crew leader level. The manual will also provide useful expeditionary construction planning factors for use by planners at all levels. **Status:** Estimated publishing date is 3QFY11.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division
Doctrine Branch, Engineer Division

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
TM 3-34.43 (*FM 3-34.451) (*FM 5-472)	*Materials Testing*	Pending Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well. **Status:** Estimated publishing date is 2QFY11.
TM 3-34.65 1/2 (*FM 3-34.465)	*Quarry Operations*	Pending Mar 05	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. There will be a focused staffing only for this manual. **Status:** Preparing Volume II. Initial Draft staffing of both volumes 2QFY11.
TM 3-34.49 (*FM 5-484)	*Multi-Service Well Drilling Operations*	Pending Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and Marine Corps includes the newest technologies, current practices, and revised formulas. **Status**: Estimated publishing date is 2QFY11.
TM 3-34.56	*Waste Management*	New	This manual addresses issues not currently integrated into FM 3-34.5, *Environmental Considerations*. The manual will address the role of waste management in support of deployed forces, as well as the integration of waste management throughout the operations process, including its critical linkage to the composite risk management process. **Status:** Estimated publishing date is 2QFY11.

Notes: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN Web site at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development and/or recently published. Drafts may be obtained during the staffing process or by contacting the Engineer Doctrine Branch at commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*> or by contacting commercial 573-563-2717, DSN 676-2717, or <*brian.davis6@us.army.mil*>. The development status of these manuals was current as of 29 Oct 2010.

***Publications shown inside parentheses with an asterisk beside the number indicate the current published number, but that number will be superseded by the new number at the beginning of the listing. Multiple manuals in parentheses will indicate consolidation into one manual.**

Due to the doctrine reengineering effort, some field manuals are being realigned as general subject technical manuals (TMs). These manuals will be numbered as TMs. Field manuals (FMs) dealing with Army tactics, techniques, and procedures (ATTP) will be renumbered as ATTPs.

U. S. Army Engineer School History Office. This Office maintains a multimedia collection of historical materials on the Engineer School and the Engineer Regiment. The collection—which consists of more than 17,000 manuals, 21,000 photos, 800 videos and tapes, and three million pages of documents on engineer history—includes information on units, equipment, organization, and operations that can support mission requirements and analysis efforts. The Office is seeking to expand its holdings on engineer units and requests that a copy of photographs, videos, or documents that are generated by units be sent to: History Office, U.S. Army Engineer School, 320 MANSCEN Loop, Suite 043, Fort Leonard Wood, Missouri 65473, or to <*leon.usaeshistory@conus.army.mil*>. The History Office also maintains a milBook page at <*https://www.kc.army.mil/book/groups/engineer-historian*> and a web page at <*http://www.wood.army.mil/wood_cms/usaes/2332.shtml*>.

Any questions should be directed to Dr. Larry Roberts at 573-563-6109 or Dr. David Ulbrich at 573-563-6365.

Photo by Specialist Jessica D. Zullig

ENGINEERS TRAIN IN REAL "FIRE POWER"

By Specialist Jessica D. Zullig

Photo by Specialist Jessica D. Zullig

A 573d Clearance Company Soldier sprays foliage with flames during a test of the GTS.

Flaming brush and debris were whipped by the afternoon breeze at a range near Contingency Operating Base Speicher, Iraq, during a Ground Torch System (GTS) exercise for Soldiers from 4th Platoon, 573d Clearance Company, 1st Engineer Battalion, 130th Engineer Brigade, White Sands Missile Range, New Mexico. The GTS will be added to the engineers' arsenal to combat improvised explosive devices (IEDs) by clearing foliage that can conceal the explosives along patrol routes. The system expels a burning gel-like fuel that covers the targeted area and eliminates the concealment.

Roadside foliage makes it difficult for patrolling Soldiers to spot hidden IEDs. Units equipped with GTS will be able to eliminate that foliage and make it more difficult "for the enemy to get out there and hurt our people," said the GTS instructor. Soldiers received in-depth training about safety precautions, standard operating procedures, fuel mixture, and factors such as atmospheric conditions that can affect the system's capabilities. After that training, the Soldiers performed a live-fire exercise to learn what the GTS can do. The system is another tool the company can use to better accomplish the mission by helping Soldiers see threats on the side of the road.

The brigade's mission is to clear roads, and the company is the spearhead of that. They have to go out and make sure the road is cleared of all IEDs during the daytime or nighttime. The GTS allows them to complete their mission, and when the company's mission is completed, it means the brigade's mission is completed.

Specialist Zullig is a journalist serving with the 135th Mobile Public Affairs Detachment under the 3d Infantry Division in Iraq.

Castle Ball: 412th Theater Engineer Command Warfighter Seminar

By Major Jesse H. Stalder

With a comedic style reminiscent of a Bob Hope USO tour, the 52d Army Chief of Engineers, Lieutenant General Robert L. Van Antwerp, delivered the keynote address during the annual Castle Ball at the Vicksburg, Mississippi, Convention Center on 5 June 2010. The ball, which consisted of Vicksburg engineer community members and 412th Theater Engineer Command Soldiers, was the culmination of the 412th's Warfighter Seminar that started on 2 June.

Van Antwerp used his keen sense of humor to highlight some of the significant events currently on the way in the United States Army Corps of Engineers (USACE). For example, he talked about the Asian carp, a type of fish that engineers in Illinois are trying to keep from getting into the Great Lakes. "I am waiting for some chef to figure out how to cook this thing just right," Van Antwerp said. "It eats everything and starves the rest of the fish out."

He also talked about the 8, 213 individuals that USACE hired from the private sector at the end of 2009. "There was an incredible amount of talent out there, and we got a ton of it," Van Antwerp said. "We are going to hire 8,000 people this year, and we are on track to actually exceed that ... we have never hired on this scale in my lifetime."

He then talked of modifications currently being made to the Panama Canal that will change economies in the world. A new lock system scheduled for completion in 2014 will have a major impact on the 928 deepwater ports in the United States, according to Van Antwerp. "That lock is 1,600 feet long and it is going to be about 120 feet wide," he said. "The current Panamax ship carries 4,600 containers . . . . The Panamax ship of tomorrow going through the new lock system will carry 12,500 containers; it is that much bigger." In the future, ship designers will only design vessels that will fit the new Panama Canal lock system. The new Panamax ships must have a hull that is deeper by 5 feet, and all ports will be 53 feet deep, according to Van Antwerp, so that most U.S. ports will need to increase their present depths of 52 feet by 1 foot.

As he often does at the start of a presentation, Van Antwerp assigned an audience member to be his timekeeper and coached her on how she should tell him that his time was up. When the time had elapsed, she stood up and said, "Chief, thank you for your general remarks; you are generally out of time."

Major Stalder is the deputy public affairs officer for the 412th Theater Engineer Command at Vicksburg, Mississippi, where he has been assigned for two years. He holds a bachelor's in education from Washington State University and a master's in educational leadership from City University, Bellevue, Washington.

Lieutenant General Robert L. Van Antwerp interacts with audience members during his keynote address at the Castle Ball at the Vicksburg Convention Center in Vicksburg, Mississippi.

Photo by Specialist Lisa Soule, Mobile Public Affairs Detachment

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